

MAKE AND MODEL	BODY			MOTOR		COOLING		IGNITION		TRANSMISSION				BEARINGS		TIRES											
	H.P.	Type	Tons	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Whelbase	Tread	Frame	Motor	Transmission	Axle	Weight	Front	Rear	
1. Rapid	20.0	Extra	1 1/2	5	5 1/2	5	Single Tubular	Cent. T.	None	Storage	Storage	3 mech.	3 plate	Plan.	2	Frame	2 chain	100	56	Angle	2 plain.	Plan.	Roller	Roller	2 250	32 1/2	32 1/2
2. Rapid	22.0	Extra	1 1/2	5	5 1/2	5	Single Tubular	Cent. T.	None	Storage	Storage	5 mech.	3 plate	Plan.	3	Frame	2 chain	114	56	Angle	2 plain.	Plan.	Roller	Roller	2,000	34 1/2	34 1/2
3. Rapid	24.0	Extra	1 1/2	5	5 1/2	5	Single Tubular	Cent. T.	None	Storage	Storage	5 mech.	3 plate	Plan.	3	Frame	2 chain	114	56	Angle	2 plain.	Plan.	Roller	Roller	2,000	34 1/2	34 1/2
4. Rapid	24.4	Extra	1 1/2	5	5 1/2	5	Single Tubular	Cent. T.	None	Storage	Storage	5 mech.	3 plate	Plan.	3	Frame	2 chain	114	56	Angle	2 plain.	Plan.	Roller	Roller	2,000	34 1/2	34 1/2
5. Rapid	25.0	Extra	2	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	9 mech.	Disc	Sel.	3	Frame	2 chain	160	68	Channel	3 plain.	Roller	Roller	7,500	36 1/2	36 1/2	
6. Rapid	25.0	Extra	2	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	9 mech.	Disc	Sel.	3	Frame	2 chain	160	68	Channel	3 plain.	Roller	Roller	7,500	36 1/2	36 1/2	
7. Reliance	31.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	11 mech.	Disc	Sel.	3	Frame	2 chain	120	58	Channel	4 plain.	Roller	Roller	4,500	34 1/2	34 1/2	
8. Reliance	35.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	11 mech.	Disc	Sel.	3	Frame	2 chain	138	63	Channel	4 plain.	Roller	Roller	5,900	36 1/2	36 1/2	
9. Reliance	35.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	11 mech.	Disc	Sel.	3	Frame	2 chain	138	63	Channel	4 plain.	Roller	Roller	5,900	36 1/2	36 1/2	
10. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
11. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
12. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
13. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
14. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
15. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
16. Reliance	40.00	Extra	3	5	5 1/2	6	Single Cellular	Cent. T.	None	Storage	Storage	14 mech.	Disc	Sel.	3	Frame	2 chain	148	63	Channel	5 plain.	Roller	Roller	7,000	36 1/2	36 1/2	
17. Reliance																											

Headquarters during week for American Automobile Association, New York Automobile Trade Association, Bureau of Tours of Automobile Club of America and American Motor Car Manufacturers' Association.

Reasons Why One Should Buy

AMERICAN SIMPLEX: George S. Waite, Sales Manager

—Suppose you could remove from the four-cycle automobile engine you are interested in, all valves, guides, springs, noisy front gears, and the other complications incidental thereto and add immeasurably more power, would you not consider that you had radically improved the car, and increased your motoring satisfaction?

You cannot, of course, nor can the man that designed it. But that is exactly what we do in the American Simplex. We eliminate these objectionable working parts and dismiss forever the four-cycle "bugbear," intermittent power.

In design and mechanism, it meets the certain approbation of every engineer who inspects it. In construction, it is sturdy and powerful, adhering to a high standard with a painstaking attention to the most minute details, possibly only in a thoroughly equipped factory and under the supervision of a competent engineering force.

In a word, a manufactured, not an assembled car.

We possess the unqualified endorsement of American Simplex owners all over this broad continent, and in the multitude of counselors there is safety.

If the foregoing statements are correct—and we invite corroboration—there is no reason why an automobile buyer should not purchase the American Simplex motor car.

ATLAS: P. A. Williams, Jr., Sales Manager—The average automobilist to-day demands safety, comfort, silence, style, power, fair speed, simplicity, durability and low maintenance charge—and usually a fair price. The Atlas combines all of these features to a greater extent than any other car.

First—Safety. Every part of the engine and car is made of the best quality of material—thoroughly tried and tested under severest conditions.

Second—Comfort. Experience has shown that the three-quarter elliptic spring now being generally adopted and first used in this country on the Atlas cars gives the easiest riding car, eliminating all side sway of the platform springs—the springs of the Atlas are extra long, three-quarter elliptic, made from imported Krupp silicomanganese steel, the best material known for this purpose—which, combined with the long 128-in. wheelbase, gives a car which for comfort has no superior.

Third—Silence. The absence of external moving parts makes the engine the quietest engine running.

Fourth—Style. Atlas cars are classy in lines, are highly finished and handsomely upholstered in hand-buffed leather with every convenience and comfort.

Fifth—Power. The Atlas 60-horsepower engine is the highest-powered engine put into a medium-price car; furthermore, this power is developed at an engine speed of twelve to thirteen hundred revolutions, giving an available power in the hands of the ordinary user for general work and hill-climbing.

Sixth—Speed. This power gives ample speed for every class of work.

Seventh—Simplicity. The Atlas engine is the simplest engine built—a crankshaft and two moving parts to each cylinder.

Eighth—Durability. The Atlas engine will outwear any other automobile engine built. The crankshaft is hardened, ground and polished; the bearings and shaft are indestructible under ordinary conditions and engine parts replacements are unknown.

Ninth—Low Maintenance. The absence of replacement makes the maintenance cost the lowest.

Tenth—First Cost. The price is several hundred dollars less than any other car of equal power and quality.

BLACK-CROW: C. C. Darnall, Sales Manager—The all-important reason why a buyer should invest in a Black-Crow car is that by so doing he can get all of the important features, up-to-date improvements, and standard equipment known to

the present-day automobile manufacturer at the astonishingly low price of \$4,000, within the reach of everyone.

The 107-inch wheelbase affords ample leg room in the body, greatly benefits the riding qualities and gives the car a big appearance. The motor is assembled en bloc with a five-bearing crankshaft, and runs absolutely noiseless. The constant level self-contained splash lubrication system, in connection with a plunger pump, is a late improvement. The multiple-disc clutch, containing a sufficient number of large steel discs and a heavy spring, permits of gradual engagement and is perfectly dependable.

Large honeycomb-type radiator, in connection with spacious water jackets, forms an ideal cooling system. The Remy magneto furnishes a desirable current supply and ignition system. The straight-line shaft drive, in connection with a single universal joint and rear axle transmission, is a construction that is rapidly coming to the front. The selective-type sliding-gear transmission requires no comment. There is not a gear in the transmission of less than $\frac{3}{4}$ -inch face. The gears are set on square shafts instead of being fastened with keys and the shafts run on Hyatt high-duty roller bearings. Hyatt-roller bearings are used throughout with the exception of the front wheels, which turn on two-point balls.

Control, consisting of two foot pedals, two hand levers and a large steering wheel with spark and throttle control on top of wheel, is just the same as that found in nearly all high-priced, high-grade cars.

Taking the car as a whole, it is a nicely finished, neat appearing, easy riding, smooth running and perfectly reliable machine.

BRUSH RUNABOUT: Brush Runabout Company—Perhaps there is no other automobile which fills the peculiar position of the Brush Runabout. It has been called "everybody's car"; properly so, in view of its general utility, it being used, for illustration, in the plant of the Chalmers-Detroit, for messenger service, delivering material and the dozen and one things for which a serviceable car can be employed around a big plant, and in the doing portrays a condition which should be readily appreciated, i. e., the Brush is a serviceable car, free from complication, easy to start, sure to go, and devoid of annoying complication.

The design of this car differs from the underlying scheme of the average small car, in that it is not a study of some ponderous touring car; it is especially contrived in every particular to serve a utility end. The style and finish of the car, while differing, may be regarded nevertheless, as satisfying, and in road work, whether in pleasure or utility pursuits, the car has proven out. The best argument that can be advanced for the Brush then, all things considered, is that it is selected for every class of use by buyers of acumen, and it is being sold by the thousand, after wide opportunity to find out its qualities, the prime idea being that it is a nimble serviceable automobile.

CARTERCAR: W. H. Radford, Sales Manager—The reasons a prospective automobile purchaser should buy a Cartercar are that it will give a maximum amount of service, at a minimum cost in expense and trouble, for the longest time, in the hands of an ordinary user. The car will climb a 50 per cent grade with a full load and will plough through mud holes and sand spots which stall other cars.

Reasons for this are that with a friction transmission, any number of speeds are obtainable and the same ratio of motor power is delivered to the rear wheels on the lower speeds as is delivered on high. Opposed to this, the lower speeds on cars with geared transmission consume a much higher percentage of power when it is needed the most, as in sand, on hills, slippery streets, etc.

The chain-in-oil drive is practically noiseless and does not require attention except in adding a little lubricant from time to



American Simplex Two-Cycle, Four-Cylinder 50-Horsepower



American Traveler Four-Cylinder 50-Horsepower



Atlas Two-Cycle, Four-Cylinder 60-Horsepower



Brush One-Cylinder, 10-Horsepower Model D Coupe



Brush One-Cylinder, 10-Horsepower Model D Runabout

time. An inexperienced driver could operate the Cartercar without injuring the mechanism. The single-lever control avoids the possibility of confusion in operating the car. There is no clutch to slip—no gears to strip—no grease packing—no universal joints—no shaft drive and no bevel gears. Surely a car which is a complete success with these omitted is a good proposition.

On crowded city streets or rough roads any lower speed could be dropped into with ease and there will be no grinding of gears or racing of the motor.

This car is built along the latest approved lines, has style and snap, is roomy and elegantly finished. The equipment is complete and the value is real.

CHADWICK: M. H. Adams—The Perfected Chadwick Great Six to-day presents a strong appeal to the prospective customer because of a mechanical construction original and distinctive and small details producing a complete and harmonious whole, tending to fulfill every function that would prove desirable in an ideal car.

The control of the car is of wonderful flexibility, cars throttling from seventy (or better) miles per hour on direct, to five, without the slightest skipping or irregularity of running in the engine whatever. The carburetor, the engine control, the clutch, the steering gear, the transmission and the entire driving mechanism of the car have been designed with special reference to ease of handling both at high and low speeds.

It is only by the employment of exclusive designs that many of the serious faults in motor-car construction have been overcome. While ease of control in a high-powered motor car is a luxury, ease of riding qualities is even more so, and the use of a peculiar type of spring design and flexible chain drive, with the correct proportioning throughout the entire car, give ease of riding qualities which are unsurpassed, and are of the very utmost importance in any car capable of high speeds.

Durability as a factor has been carefully considered and worked out after many years of experience. The employment of correct engineering design, the use of the highest quality of special materials, the maintaining of an organization whose standard is the very highest quality of workmanship, have produced to-day a car capable of enormous mileage with minimum upkeep. In any motor car the factor of safety to the individual, the assurance against expense from defective design or material are of the utmost importance. In the Chadwick car are not only embodied that quality of material and workmanship that is a positive guarantee of safety, but throughout it contains details of design and construction which are designed solely with reference to protection against accidents.

On this car the entire steering mechanism is to-day the most carefully designed of any car in the world, and the same attitude is carried throughout the entire chassis. As a rule, a car strong in mechanical design and construction does not have body designs of equal attractiveness, but in the Chadwick car the body designs are beautiful, graceful, and each and every detail of body design is correct in every particular and will satisfy the most discriminating purchaser. The Perfected Chadwick Great Six is to-day offered as the production of an organization whose only aim is to build the very best.

CRAWFORD: Geo. D. Crawford, Treasurer—The following qualities should influence a careful buyer of an automobile to select a Crawford: It possesses the power requisite to a satisfactory car, not only sufficient to enable it to carry its load swiftly and smoothly over the ordinary road, but reserve force equal to all road emergencies.

This power is transmitted through gears made of special grade of nickel steel, tested to stand the greatest strain.

The Crawford will commend itself by its practicability and simplicity of design, eliminating complications, fads, and fancies in mechanism, reducing loss of power from friction to a minimum, and by its beauty of outline, perfection in finish, comfort in riding, and further, in that it offers the highest intrinsic value.

EMPIRE: J. G. Wood—Empire cars were designed to meet the requirements of the man who desires to purchase a car of not only low first cost, but low maintenance cost, realizing that a large per cent. of the maintenance cost of a car lies in the wear and tear of the tires. The Empire cars are built with this primarily in view.

Contrary to the average practice of making small cars extremely light, the Empire Company has added weight where they thought it was necessary. For this reason such parts as axles and parts of the driving mechanism are unusually heavy, in fact as heavy as many of the medium-sized touring cars.

The car is extremely easy riding on account of its spring suspension, which consists of four-sided platform springs in the rear and three-quarter elliptics in the front. This in conjunction with a double sidechain drive practically eliminates undue tire wear, also relieves all excessive strains from the frame and driving mechanism. The double sidechain drive is very neatly installed, the chains being run in pressed-steel housings so that they are absolutely noiseless and give no trouble whatever.

Tire equipment is rather unusual for a car of this price, 32 by 3-1/2 inch size being used all around, q.d. rims being furnished as regular equipment. The car is also equipped with a Remy dual ignition system.

In brief, the Empire cars are extremely well adapted to the use of doctors or salesmen who must take into account the maintenance cost of a car.

GAETH: L. E. Stone, Secretary—We would present the following arguments to convince a prospective purchaser that the Gaeth car suits his purposes:

In the first place our car is the simplest standard, four-cylinder car in every respect now being manufactured.

In addition, due to our limited output each car is constructed, tested, and inspected under the personal supervision of our designer, Paul Gaeth.

Third, our car is equipped with make-and-brake ignition which has proven unique in its simplicity and reliability, and besides is the only make-and-break ignition which will start on the spark in the same manner as the high tension.

Fourth, our thermo-syphon system of cooling has been brought to such a state of perfection that we have absolutely no trouble in cooling our motor under any circumstances of usage. This system eliminates the necessity of a pump with its troubles.

Fifth, the greater part of our car is manufactured and finished in our own shops.

Sixth, we use every effort to make our car as well finished in all details as any machine upon the market, irrespective of price.

Our machine is constructed of the best obtainable materials, and in such a manner that there can be no question as to its long life, durability and satisfaction.

GLIDE: R. A. Whitney, Sales Manager—In presenting the 1910 Models of the Glide to the public, we shall continue to stand on the platform of "Quality" backed up by a long and growing list of satisfied users scattered over the entire United States.

Our nine years of experience in manufacturing Glide cars has been a constant progress of eliminating weak points and substituting those features which have been found worthy, until the Glide stands to-day fully standardized, perfect in detail, and offers a full dollar of value for every dollar of price asked.

The Glide has pioneered many of the basic features now used successfully by some of the best American cars and we cheerfully invite comparisons, irrespective of price.

We have found no radical changes necessary in our 1910 Models, such changes being rather in refinement of detail and finish. The body lines have been refined, weight reduced, frame and body lowered without reducing the road clearance, larger tires and a straight-line drive, steering wheels are larger and all woodwork of Circassian walnut. The 1910 Glide has a dozen other features, every one of which are real improvements.

We guarantee satisfaction. We guarantee every piece and



Chadwick Six-Cylinder 60-Horsepower Touring



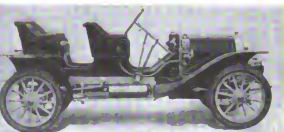
Chadwick Six-Cylinder 60-Horsepower Runabout



Chase Two-Cycle Three-Cylinder 20-Horsepower



Coates-Gosken Four-Cylinder 32-Horsepower



Cole "33" Four-Cylinder 30-Horsepower Touring



Crawford Four-Cylinder 30-Horsepower Touring



Cameron Air-Cooled Six-Cylinder 36-Horsepower



Demot Two-Cylinder 10-Horsepower Runabout



Empire "20" Four-Cylinder 20-Horsepower Model B



Everitt "30" Four-Cylinder 30-Horsepower Touring

part of a Glide car for one year free of defective material and imperfect workmanship, and will make good if such a piece is found.

Glide cars are now built throughout in our own shops, and with our new factory giving us 85,000 square feet of additional floor space, we feel the Glide is just entering on a new era of prosperity and that we are in a better position than ever before to make prompt deliveries and meet the demands of our agents and customers.

HOLSMAN: George E. Sherman, Advertising Manager—If you are looking for a practical, every-day-in-the-year car, that will negotiate all kinds of roads in all kinds of weather, you should buy a Holman, because of its:

1. Solid Tires—which eliminate the enormous cost and trouble attendant upon the use of pneumatics. The high, flexible wheels make easy riding.
2. Simplicity—No differential. No transmission gears. No clutch. Easy control.
3. Direct Drive—from motor shaft to wheels on all speeds.
4. All-Ball-and-Roller-Bearing Motor—friction bearings and connecting rods being entirely eliminated.
5. Superior System of Lubrication—gasoline solution.
6. Economy of Up-Keep—on account of small number of parts.
7. Durability—many Holmans have been in daily service six and seven years.

8. Hill-Climbing Ability—look up our Algonquin hill-climbing records. The direct drive, the high horse-power as compared to the weight of the car, and the application of that power near the outside rim of the rear wheels (where the greatest leverage is secured) make the Holman able to go through sand, snow, slush and mud and up any hill ordinarily traversed by horse-drawn vehicles.

HUPMOBILE: R. C. Hupp—The real reason that the manufacture of the Hupmobile was decided on was the direct result of the experience the writer had in the production of cheap cars. In years gone by it has been assumed that as a man did not pay a high price for an automobile he could not expect to have it stand up. The cheap cars were always spoken of as being very good cars "for the money." In a great many cases these cheap cars were of pretty good size; in fact, they nearly always were heavy. The cheap cars without exception had planetary transmissions and used dry cells for ignition.

A small car was therefore mapped out by us in which we incorporated only the very best material. Our drawings specified close work, and the result was that we found we could build a small car of the highest grade at a low price. We discovered one thing absolutely, and that is that the bigger the automobile that is made right, the more it will cost. By placing our seats well back and using a patented spring suspension we found that we could carry two large people to the very best advantage. After having produced one thousand cars we find that this car has opened up an entirely new field in the automobile business. It has absolutely dissipated the former idea that a small car cannot be made well, and appeals, not only to people in moderate circumstances, but has become very popular with those who maintain large cars and wish the small car for general use.

INTER-STATE: C. E. Easton, Advertising Manager—Principal among the reasons why a man should buy an Inter-State car is the fact that we started in the automobile manufacturing business at a time when motor car practice had become standardized, and we incorporated in our first models only those features which had been tried out and found satisfactory.

The most important reason for our ability to give greater value is that the reliable features which have been developed by countless experiments made by the motor car trade were at an enormous cost to themselves. By embodying these features in our first models it enabled us to give more motor car for the money than even the older manufacturers.

Then in our new models we have further refined the high standard of design, material and workmanship, making it a high-grade car at a moderate price. These refinements consist of more power, longer wheelbase, adoption of three-quarter spring suspension, rolling push rod contact, multiple disc clutch of 63 tempered steel plates and 6 springs, eliminating the possibility of the weakening of a single spring construction.

A unit construction is carried out from the point where the power leaves the motor to the rear wheels. This transmission and axle system is practically as strong as if the complete system were one single casting or forging, as all connections and flanges are designed to give the highest factor of safety possible.

The transmission is especially interesting from the fact that the clutch and gear set are contained in a single aluminum case. The gears are of vanadium steel and are one size heavier than have ever been used before. This eliminates wear and breaking of gears, but does not decrease the ease of shifting, as all engaging teeth are chamfered with an improved curve.

Other features of particular importance are the centrifugal pump integral, with crank case; the rotary gear oil pump outside of crank case, giving perfect accessibility; the high tension imported U & H magneto. All of this equipment is located on one side of motor and driven by one shaft, the simplicity and perfect alignment of these parts being at once apparent to any one lifting the hood.

Last, but not least, a perfect interchangeability of parts. This is accomplished by our almost perfect machine tool equipment, as at the time of installing these machines the machine tool trade had produced automatic machinery especially adapted to automobile manufacture.

JACKSON: Jackson Automobile Company—From the agent's point of view, the Jackson offers attractions, among which a line of cars covering the requirement, most thoroughly, there being 50, 40, and 30 models, and the "30," which is intended to be a popular car, has a magneto in the ignition system as well as many other refinements, which, but a year or two ago, would have to be searched for in high-priced "foreign" automobiles.

Then, in Jackson cars, of all models, there is a certain harmony from the engineering point of view, which, for that matter, would be of small avail were it not for the Jackson policy of having in the shop a wholesome respect for the intentions and demands of the engineers who lay out the cars. But, even good intentions, in the absence of good facilities, would count for naught; in the Jackson plant, as well as fine machine tools with which to do the work, there is a wide equipment for use in drop-forging the parts, and with this equipment, attended by a heat treatment department of competence, the engineer has but to say the word and he may have anything he indicates.

Prompt delivery, if it does not mean hurry, is worth more than a little, and, in the Jackson plant, in view of the scope of facilities offered, there is ample evidence of ability to deliver without having to stint the process. Materials, such as should be used in automobile construction, are available in the Jackson storeroom in quantity sufficient and to spare. The purchasing department, acting in conjunction with the engineering department, settled this important matter many months ago, and purchasers, as well as agents, are now in a position to reap the reward. Jackson results is what they will get, and the Jackson reputation is not at stake.

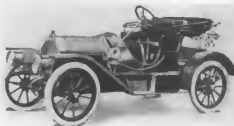
KLINE KAR: William P. Seig—The Kline Kar 40-50-horsepower car is the best offering at anything near its price because it is the only six-cylinder motor with en-bloc system, a bearing between each cylinder and each cylinder removable, one independent of the other, and includes in its specifications: 36-inch wheels, 122-inch wheelbase, three-quarter scroll elliptic springs, selective sliding gear transmission, two separate systems of ignition, including Bosch magneto, and single unit coil with switch located on the steering column, flat tube cellular radiator,



Ford Four-Cylinder 20-Horsepower Touring



Firestone-Columbus Four-Cylinder 25-Horsepower



Firestone-Columbus 35-Horsepower Runabout



Gaeth Four-Cylinder 38-Horsepower Touring



Glide Suburban Four-Cylinder 40-Horsepower



Hupmobile Four-Cylinder Light Roadster



Inter-State Four-Cylinder 40-Horsepower



Jackson "50" Four-Cylinder Touring



Jackson "30" Four-Cylinder Touring



Kline Kar Six-Cylinder 40-Horsepower

11-inch road clearance, full floating rear axle, "I" beam front axle, high-grade finish, best grade hand-buffed leather upholstery. Rushmore lamp equipment, straight line body, the lines carried out inside the tonneau, giving ample room for the occupants, thus eliminating cramped positions. The dash, hood strips, rim on steering wheel, coil box, strip on top of tonneau doors are all made of Circassian walnut, alloy of steel used throughout, and, in fact, everything installed in the car is the best that money can procure and skilled mechanics can manufacture.

McINTYRE: George F. Lemon, Sales Manager—Having been asked why a man should buy a McIntyre, the writer would like to know in return why a man should *not* buy a McIntyre. Never having been in the market for a motor car, we may not have the correct viewpoint, but it would seem that a purchaser of one would be largely governed by the same principles that apply in the purchase of any other article. Most purchases are made, we think, from the buyer forming the opinion that the article he is purchasing possesses merit to a greater degree than competing articles, thus putting the article to be purchased on a comparative basis.

There are no secrets about motor car construction. The materials which enter into such construction may be bought in such quantities as may be desired (if one is lucky and places one's order far enough in advance), and of such varying degrees of goodness as may be desired. No one manufacturer has a monopoly of labor, skill, or brains, consequently it would seem that the production of a good motor car would be dependent (as is most other lines of manufacture) upon the tendency of the manufacturer to give the most in quality and quantity for the money.

We have assumed that we could manufacture a four-cylinder motor car and sell it for \$1,400 which would embody every detail of simplicity, comfort, and quality. And in designing the McIntyre 30 we have borne in mind all that has been accomplished by other manufacturers—and, as stated before, there is no uncertainty as to what constitutes goodness in automobile construction. For instance, it is pretty generally conceded that transmission gears, etc., shall be made of a certain quality of nickel steel, that an open-hearth steel, free from phosphorus, silica, etc., and running rather high in carbon, makes the best crankshafts; that a wheelbase of at least 112 in. is necessary to have an easy riding car; that 36-in. wheels are better than 32 in., and so on.

In offering the McIntyre 30 we are offering a car which possesses absolutely every feature possessed by any five-passenger car, except that of extreme speed—so we would like to know why shouldn't a man buy a McIntyre, when by so doing he can save anywhere from \$300 to \$1,000 and get everything that is to be had at any price, except great speed, in a five-passenger touring car.

We know this is a mighty broad statement, but we say it advisedly and with a full understanding of its meaning in every particular. A great many men who know something of motor car construction have asked the writer how we can give so much car at the price. There is a reason, of course, but it is another story. Suffice it to say that we do it. While this refers particularly to the McIntyre 30, it is also true and to the same extent of the McIntyre 20 at \$600.

Again we ask, why shouldn't a man buy a McIntyre?

MARMON: Nurdyke & Marmon Company—The Marmon "Thirty-two" is moderate in size, power and weight—consistent in price. Designed and manufactured entirely by a concern of sixty years' manufacturing experience, whose products enjoy a world-wide reputation second to none.

This Marmon car is manufactured from the best materials obtainable, and the workmanship is of the highest order. The proof of this is apparent to any one who will take the trouble to see for himself by visiting the factory. It is the easiest riding car in the world—those who own it say so; so do those who ride in it. It is easy on tires, because it is properly proportioned in

weight with reference to power and capacity. It has a simple, economical and unfailing oiling system—a system found only in the Marmon car. The brakes are more than adequate. The rear system is simple, clean-cut and very accessible. The body is of cast aluminum and steel—far more substantial and better finished than usual.

The stability of the car has been proved beyond question by its success in the hands of users, and notably by its showing in Glidden tours and many endurance contests, and by winning many long races on track and road.

MAXWELL: C. W. Kelsey, Superintendent of Sales—All automobile salesmen are alike in that they are naturally prejudiced in favor of their own article and see their competitors' goods only in a distorted way, magnifying their faults and minimizing their good points, so that it is hard for a prospective customer to get honest opinions. Owners are likewise biased in favor of the cars that they have; thus the buyer, oftentimes handicapped by the lack of mechanical knowledge, is in no position to judge, and buys the car handled by the best salesman.

Now, in order to reach all classes of customers and to avoid, so far as it is possible, these natural prejudices, we will compare our car with those high-grade, high-priced American machines which on American roads and under American conditions stand to-day pre-eminently in the highest ranks, namely, with the Packard, Pierce and Peerless.

Take, for instance, the Maxwell motor. In general design it is almost exactly like all of these. The cylinders are of the T-head vertical type, with the valves on opposite sides interchangeable and mechanically operated, and cast from gray iron. On all of these cars this type of cylinder is used. The crankshafts on the Maxwell car are drop-forged, heat-treated and ground to one one-thousandth part of an inch and run on multiple bearings, all of which is precisely the same as will be found on other cars.

Crankcase and transmission case are cast from aluminum alloy. This same material is likewise used on these other machines. In our transmission we find one of the greatest variations, but so far as the material and its treatment is concerned they are alike, even to the sand blasting which the gears receive.

The clutch on our cars is different from those employed on any of these, but then every one of the above employs a clutch different from every other. We use the multiple disc type running in oil. We have never used anything else.

The Maxwell radiator is of the cellular type which is found on all three of these cars. It is just as finely constructed, and costs in proportion to its size just as much.

We use an American-made magneto instead of an imported foreign one, as these cars do. We believe that this magneto will give equal results. On the Maxwell car that ran 10,000 miles without stopping its motor we used one of these, and it proved up to our entire satisfaction, giving absolutely no trouble.

The drive from our transmission to the rear axle is the same as is used on all of these cars—that is, a shaft drive with two universal joints. Our rear axle is the standard live type.

The bodies on all Maxwell cars are made of steel instead of aluminum, as is the case on some of these high-priced cars. The difference is that the aluminum costs more, and is lighter, but it has not the strength the steel has. The painting of these bodies is much the same in all plants, though our bodies are sand blasted in order to make the paint adhere permanently. All receive approximately the same number of coats of paint.

Maxwell bodies are upholstered in real leather, using real hair for stuffing. This leather is of excellent quality. It does not cost us, however, as much as the specially finished enameled leather used on our more expensive competitors.

All machinery parts in our cars are as accurately made and of as good a quality material as can be furnished. All revolving and reciprocating parts, like the pistons, piston rings, crankshafts, push rods, cylinders, etc., are ground. The material varies



Kissel-Kar Four-Cylinder 40-Horsepower



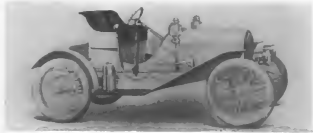
Marmon "32" Four-Cylinder Touring



Maxwell Model E Four-Cylinder 30-Horsepower



Maxwell Model Q Four-Cylinder 22-Horsepower



Metz Two-Cylinder 10-Horsepower Runabout



Mitchell Six-Cylinder 60-Horsepower Touring



Mitchell Four-Cylinder 30-Horsepower Runabout



Middleby Air-Cooled Four-Cylinder 20-Horsepower



Moline Model M Four-Cylinder 30-Horsepower



Mora Light Four-Cylinder 40-Horsepower

with the different parts, from chrome vanadium to ordinary cast iron, each one of the best for its particular purpose.

Now you will say, if you use the same material and your workmanship is just as good, why the big difference in price?

Well, in the first place, our material is only the same in the vital and important mechanical parts, like the axles, motor, transmission and frame. We save on our bodies. We have by using steel shifting levers, brass plated, instead of solid brass, and so on, and of course with our three enormous plants, with their magnificent equipment, and our tremendous capital, we are enabled to manufacture practically every part in our own shops. This, of course, saves us the profit, parts manufacturers would make were we to buy outside. But the real economy comes in the great quantities which we manufacture and sell.

Our output is three times the output of the Packard, Pierce and Peerless combined. We have only one sales organization for all of these cars, instead of three for one-third the number. Our advertising only costs us what any one of these companies would spend. We have only one president and one general manager to pay instead of eight, and then you must remember that when you buy a Tiffany setting you pay for the name "Tiffany." There is no charge for the name "Maxwell" on a Maxwell car.

METZ: C. H. Metz, President—No argument will induce the man who longs for a palace and who has the means to acquire and maintain it, to put up with being in a modest cottage.

The expense of maintaining our little car in comparison with the big tourist is in about the same proportion as the cost of dwelling in a cottage is to the luxury of living in a mansion.

If it is a matter of how many miles per dollar for your automobile use and pleasure, we can figure as close as anyone in the business, and our statements can be substantiated. We do not pretend to tell you what you should purchase, but you owe it to yourself, if your means are limited, to ascertain which car will carry you the farthest with the least trouble and expense, coupled with the greatest amount of comfort. This is what we had in mind when we designed and built our light and serviceable Metz car. That our judgment has been sound is evinced by the recent almost universal tendency abroad for smaller and lighter automobiles.

MIDDLEBY: Middleby Auto Company—Among the many reasons why a man should buy our make of car is the fact that we are making a car at a low price, but at the same time giving material and workmanship that goes into a car for twice or three times its price. All the cars of our latest type that we have on the road are giving perfect satisfaction, proving themselves to be cars for all kinds of roads and country.

Another reason that a person should buy a Middleby car is because he can use same all year around without being troubled with the same heating in the Summer time or freezing in the Winter time.

Another reason is because it costs less to maintain than many of the cars made.

MITCHELL: James W. Gilson, Sales Manager—Now that the pendulum has swung around to the popular-priced car, the capacity of the immense Mitchell factory is being taxed to the utmost to supply the demand. Beginning in 1905, just 350 automobiles were marketed. In 1906 the number had been increased to 666, officers of the concern practically planning to increase production twofold each year. The ratio was maintained the following year, the 1907 output being 1,367. In 1908 the production was 2,166 cars despite the hard times, while the 1909 supply was a trifle more than 3,000 cars. The output of 1910 models of all kinds will approximate 6,700 cars, or \$7,000,000 worth in round numbers.

Arguing backward from all this demand, which has been built up in a natural and reasonable manner, we think that this slowly but constantly increasing demand for our product on the part of past users and their friends among whom they have spread the

good word, speaks more highly for the car than could volumes and volumes without end of exaggerated statement.

When the new six-cylinder car to sell at \$2,000 was announced, the plans called for but 500 of them in 1910. The preliminary announcement brought orders for 1,000, so that the material was ordered on this new basis. Now, it appears as if this would be insufficient to go around. This, like the story of our steady growth, argues strongly in favor of our product, that is, the fact that people want it should mean that it is worthy.

MORA: W. N. Freeman, Treasurer—The reasons why a man who is in the market to purchase a strictly high-grade car of medium size and weight and at a moderate price should place his order for a 1910 Mora is because there is in all the world no power plant like this:

A motor than which there is none better built.

A selective type transmission of same design as has been used in Mora cars for past two years, without replacement of a single gear.

An aluminum pan construction which has been thoroughly tried and tested for four years, supports motor and transmission, keeping both in absolute and permanent alignment, making a unit construction and holding everything in an accessible position to get at as well as serving as a positive mud shield. Completely housed direct shaft drive from selective type transmission to rear axle. Excellent brake construction and spring suspension. Proper arrangement for passenger load with close coupled tonneau, lending luxuriously easy riding and economical wear on tires. Mechanical construction that is right combined with exterior lines graceful and finish strictly high grade.

Very briefly stated the above are a few of the reasons why the 1910 Mora should appeal to the prospective purchasers.

Our company's motto is not how many cars can we build, but how well can we build them.

We court comparison of the Mora with cars selling at twice the price. After careful comparison, we believe, the man who knows will come to the conclusion that the Mora furnishes the greatest value offered for 1910 in high-grade cars.

NATIONAL: National Motor Vehicle Company—The National is available to that class of buyers who want to go fast and far. The motor is designed with large valves, they being fully half the diameter of the cylinder, in diameter. As a result, considering compression, setting of valves, shapes of cams, and the desired accuracy of machining of parts, the motors of this make have torque in proportion to speed, even when the speed is approaching 2,000 revolutions per minute.

Desiring to deliver automobiles of great power, which is a matter of properly designing the motors, makes it necessary to select the material with great care. As a result, in National crankshafts, for illustration, the material is absolutely without a peer, and the design is that which assures long life, it being the case that the crankshafts are statically, and in a kinetic sense, balanced.

Motors of the National characteristics require profuse lubrication, and in the National this matter has been handled without gloves. A competent gear pump, located in the under half of the motor case, delivers the requisite amount of oil to every part to be lubricated, and, in order to tell the driver where he is at, a sight glass is located on the dash, through which the oil must flow on its way. Before National automobiles are delivered to agents or users they are given a thorough test in the shop and on the road, and it is the aim of the maker to have perfect harmony among the cars which make up the product of the National plant. The chief engineer at the National is there for the purpose of fixing quality and he fixes it.

PAIGE-DETROIT: Fred. O. Paige, President—In designing the Paige-Detroit roadster, the aim has been to give the public a perfected vehicle, simple in construction, easily controlled, durable and comfortable for the rider.



McIntyre Four-Cylinder 30-Horsepower Touring



Ohio Four-Cylinder 30-Horsepower Touring



Pennsylvania F Six-Cylinder 54-Horsepower



Premier Four-Cylinder 40-Horsepower Runabout



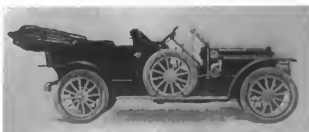
Premier Six-Cylinder 60-Horsepower Touring



Paterson Four-Cylinder 30-Horsepower Touring



Pullman Four-Cylinder 35-Horsepower



Rambler Four-Cylinder Touring Car



Regal Four-Cylinder 30-Horsepower Touring



Reo One-Cylinder 10-Horsepower Runabout

Our motor is of the valveless, two-cycle, three-cylinder type, thus eliminating over one hundred working parts, found in all four-cycle motors, such as valves, cams, rollers, push rods, rocker arms, springs, etc., with all their bearings and gears, all of which must be kept in good working order. These are the parts which make trouble and require constant attention. The three-cylinder two-cycle engine gives the same results as a six-cylinder, four-cycle.

Spring construction of the Paige-Detroit roadster is a very important feature of the car.

The car in general appearance equals the \$3,000 and \$4,000 cars.

PARRY: Max. Parry, Advertising Department—Maybe Jack went up the beanstalk, but he would have hustled mighty hard to follow the growth of the Parry Auto Company at Indianapolis. His rival is no other than D. M. Parry, famous as a leader among manufacturers, who incorporated this company last July for \$1,000,000, and after gathering about him his corps of designers, mechanics and officials, as well as the superintendent of the greatest auto factory of to-day, he told his dream.

These three facts would allow him to give away more of a car for \$1,285 or \$1,485 than all others. First, the production must be limited to two models, a roadster and a touring car. Secondly, there should be no experiments to charge to the buyer, and lastly, the 5,000 cars to be produced would permit close figuring on stock, wherewith he ended, "Let's call it the Parry idea."

Then things began to happen. The "idea" grew until in 90 days Mr. Parry was working 350 men, occupying 24 acres of buildings and delivering finished cars to agents. Even as we chronicle these events, the factory is shipping out over 10 machines a day and fast approaching the summit of the year's efforts when every night will close on the production of 35 cars.

A proof of the recognized ability of the Parry Company came in requests for \$4,000,000 worth of cars within 30 days after its announcement. The public is demanding a medium-priced car and will certainly take kindly to such as the "Parry," where plenty of power is combined with a pleasing balance of design.

The factory, lately vacated by the Standard Wheel Works, is composed of little over a mile of busy floor space upon which you may watch the complete growth of an automobile. The Parry Company machines many parts, such as crankcases, cylinders, tools and jigs. Motors are assembled at the shops and then set up in a prepared chassis, whereupon the tester breaks it in on the Parry track.

The Parry claims distinction in having a 4 1-4 x 4 1-2-inch motor, which, according to A. L. A. M. rating, owns 30-horsepower. Besides this the valves are in the head, a fact that means less heat and more power. The motor rests on a wheelbase of 116 inches and over this sets a low gray roadster or a big blue touring car. It will be interesting to watch whether this new company can turn out the proposed 5,000 cars. At present the plant is running in a most satisfactory manner and daily gathering momentum for its tremendous schedule. At its head is a capable manufacturer and if you ask him he will smile and tell you it's really too easy.

PIERCE: J. G. Cowling, General Manager—In presenting our Model "K" Pierce-Racine car to the public for 1910, we do so with every confidence, having "tried it out" under all sorts of conditions, in all weathers, and on a great variety of roads.

We have in no way attempted any freaks in our construction, but have confined ourselves to what we consider, from our long experience in motor building, the best of mechanical practice. All working parts have been tested out severely, both in the laboratory and on the road, and the fact that we guarantee the car for one year against breakage due to imperfect parts and workmanship indicates our belief in it.

The motor is the culmination of fifteen years of motor building, and the result is a quiet, smooth running and powerful engine that will take the car anywhere.

No expense has been spared in carrying out the details of construction, such as finish and equipment. Particular attention has been given to spring suspension and balance, and the whole represents a perfect motor car that will satisfy and endure.

PREMIER: H. O. Smith, President—There are numerous reasons why a discriminating buyer would be partial to a Premier, a few of the reasons which we might mention as to "Why buy a Premier," and are valuable to the intending purchaser, especially one who had not previously owned a motor car, as follows:

Because the Premier has fulfilled every promise by performance.

Buying a Premier car is an investment that pays to the buyer big dividends in service and satisfaction.

To prove why one should buy a Premier, the car has been entered into every reliability and endurance contest that promised special difficulties.

Its showing for consistency and reliability in these contests has been second to none.

Because the Premier makers have backed up every assertion they have ever made by performance and not promises.

Because every ounce of material that enters into the construction of the Premier car is the very best that can be obtained from any source or at any price.

The Premier's showing in the reliability contests is a record of consistent performance which is second to no car in the market at any price. These contests, with the observers and the technical examination, provided at the conclusion, not only show up the car and how it stands up in comparison with other cars, but is a test of every part entering into the car, and the proof of the way it stands up in service in the combination.

There is a reason for good showings as well as bad showings.

A car after all is only a combination of the several necessary parts, and the whole combination is no better than each and all of the parts.

We believe that the Premier can be judged by any feature of the car which should serve as a criterion, and the proof of the value of these several parts is shown in the results which have been obtained from Premier cars.

This proof, which amply supports the worth of every part of the Premier, should we believe be sufficient grounds for deciding upon the purchase of a Premier car.

PULLMAN: H. R. Averill, Asst. General Manager—The most potent reasons why your automobile should be a Pullman are best expressed in the two slogans adopted by its makers—"Not only the best at the price, but the best at any price" and "Some cars cost more to buy, but no car costs more to build."

The fact that Pullman automobiles are made and not assembled by the Pullman Motor Car Company is another very good reason, for every part of these famous automobiles is made under the direct supervision of some officer.

Everything of the best is used in their making, and the broad guarantee under which their agents sell makes unsatisfactory dealings almost impossible.

It is, without question, the ideal family car and to those who seek speed and power they have a model that fills the bill.

It is the winner over 40 times in contests for speed, reliability and hill-climbing, often demonstrating its superiority over other cars of twice the horsepower and cost.

Prospective owners or owners dissatisfied with their present cars will find keen satisfaction in having one of the many agents give them a Pullman demonstration, and it is well worth bearing in mind that when you start anywhere in a Pullman, you get there in the same Pullman.



Reo Four-Cylinder 35-Horsepower Touring



Schacht Model 6 Two-Cylinder 21-Horsepower



Staver Four-Cylinder 25-Horsepower Touring



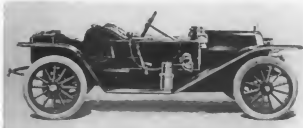
Stoddard-Dayton 10-T Four-Cylinder 30-Horsepower



Stoddard-Dayton 10-K Four-Cylinder 50-Horsepower



Speedwell 10-D Four-Cylinder 40-Horsepower



Speedwell 10-D Four-Cylinder 40-Horsepower



Black-Crow F Four-Cylinder 24-Horsepower



McIntyre Two-Cylinder 20-Horsepower



Renault Special Four-Cylinder 35-Horsepower

REGAL: N. I. Taylor, Advertising Department—Some years ago the Regal Motor Car Company built the Regal "30," the first four-cylinder 30-horsepower car to be sold for \$1,250; the original car in its class. We have always more than maintained our leadership in this class, leadership in quality, style and perfection of all working parts. The Regal "30" of to-day is not a new car, but an evolutionary product, a good car with years of experience back of it, which has been continually improved and refined, until to-day it stands unquestionably recognized as the greatest automobile value in America for \$1,250.

You should buy a Regal "30," because we positively know that in buying a Regal car you get better value for \$1,250 than you can duplicate in any other car listed at less than \$2,000. Its perfect construction, superior quality of material used, beauty of design and easy riding qualities most readily recommend it to the most exacting buyer. The Regal "30" is a beautiful traveler on rough roads and an exceptional hill climber.

Anything you want in any car at any price you'll find it in the Regal. Regal "30" can accomplish anything any other car will. The cost of maintenance and upkeep is at a minimum. We have not been annually expending enormous sums in experimenting on new cars, but our every effort has been directed toward the perfection of the Regal "30." This car is a finished product in every detail and readily meets the demands of the most critical purchasers. Regal "30" is a quality car, without the unnecessary frills. You cannot buy a better car at twice the expenditure.

REO: R. M. Owen—As a reason why one should purchase a Reo in preference to some other companies, the manufacturers offer the left-hand drive, with its attendant safety, comfort and efficiency. It is not possible to go into all of the positive advantages which left-hand control affords over the old. Suffice to say the step is well justified in the rapidly increasing popularity among experienced drivers and owners.

The reasons for the popularity of the left-hand drive at once become obvious when the questions of comfort, safety, economy, convenience and efficiency are carefully considered. Take the instance where the statutes or local ordinances require all vehicles to be so placed and headed in public thoroughfares that the right side of the car is next to the curbing. It will readily be seen that with the levers on the left side the occupants of the front seat may step directly upon the sidewalk. This is of positive advantage to both the driver and owner.

A word as to safety, comfort and efficiency. With the left drive the operator's left hand is free to shift the levers and blow the horn. This permits the exclusive use of the right hand for the steering wheel. The opposite of this prevails under the old method. There the driver must almost invariably make a quick change in handling the steering wheel from his right hand to the left in order to be able to shift the levers. Result: Two movements to do what is now done by one with the left drive. After once experiencing the happy contrast in favor of the left-hand drive very few drivers, if, indeed, any at all, would drop the new for the old.

Further, on narrow roads the driver with the left-hand drive is able to gauge more safely the clearance when passing other vehicles. This is especially true where the roads are narrow, sharply crowned and poorly ditched. Another ease of comfort plus safety equalling preference and popularity for the left-hand drive. Then it is claimed by eminent automobile engineers that the running of the vertical motor placed in front tends to depress the right side of the car which is largely overcome by placing the driver on the left side.

Doctors, rear estate men, contractors, farmers, clergymen and other business and professional men, who largely do their own driving, are especially enthusiastic over the Reo left-hand drive. The foregoing convenience, means of added comfort, economy, safety and efficiency, besides the many other practical advantages too numerous to mention herein partially account for its

popularity. It may therefore safely be said that the left-hand drive will, in another year, become practically universal.

SCHACHT: Walter H. Sly, Treasurer—The Schacht car should be purchased in preference to any machine offered at a medium price, because it is a car so designed that it can be used for any purpose that might be required of an automobile. The Schacht is fitted virtually with a combination body which can be changed in five minutes from a runabout into a surrey or family car, or a light delivery wagon, by merely rearranging the rear seat. This machine has an extra long wheelbase, which allows plenty of room back of the seat to carry goods of any description, up to a capacity of 800 pounds, and it is a machine which will readily appeal to the merchant, farmer, salesman, or any class which requires a car that must answer every purpose of a general utility machine.

There is also a patented mechanical feature on the Schacht entirely individual to it, and this consists of a double-acting clutch built into the flywheel of the motor. While a planetary transmission is used in this car, every previous objection to this type of transmission is eliminated by the fact that the transmission does not revolve on the jackshaft until the clutch is engaged in the flywheel of the motor and the car moves forward, thereby clamping the bands on the transmission and avoiding all the customary rattle, which is caused on the planetary type when the car is stationary with the motor running.

In other words the transmission is never revolved until the clutch is thrown in when the car will be in motion, and in order for the car to be in motion the bands clamp the transmission, otherwise transmission cannot revolve unless car is moving.

SPEEDWELL: H. A. Wright, Advertising Manager—Any man who drives or wishes to drive a large car should buy a Speedwell because it is superb in line and finish, because it has ample power and speed and is easy riding and extremely flexible and obedient in control.

These things granted (a demonstration instantly shows them to be true), then the only thing left to be desired to make this the ideal car is the assurance that it is properly constructed to give long life and minimum of repairs. Because in the Speedwell are found only the highest grades of materials possible to buy, and because the workmanship in the car is the best and most careful; because the car is subjected to most thorough tests and inspection in every particular—because of all these things this car does "stand up" and give most satisfactory service for years.

Now comes the real reason for buying a Speedwell. There are a few other cars approximately on a plane with the Speedwell, but none is sold at the Speedwell price—\$2,500. To get equal value in any other car you must pay one to two thousand dollars more. We concentrate all our efforts to one standard chassis with different style of bodies.

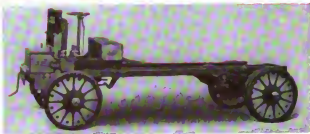
FOREIGN PLEASURE CARS

DE DION-BOUTON: George Ozanne, Manager American Branch—It is our idea that the superiority of the De Dion-Bouton motor car lies in the following facts:

1. Being the oldest manufacturing concern of small and medium cars, it has the lead of experience.
2. Its motor is the prototype of all modern gasoline motors, and it is the only one which has been endorsed by other automobile manufacturers, who have, in such large numbers, adopted the De Dion-Bouton motor for their cars. This constitutes a unique acknowledgment of the superiority of the De Dion motor.
3. Our transmission by cardan shafts is the only one which has all the advantages of the chain, and none of its inconveniences.
4. The automatic lubrication system, under pressure, of the De Dion-Bouton cars has never been equalled, and this has been one of the good reasons why the reputation of "The most durable" has always been synonymous to "De Dion-Bouton."



Chase Two-Cycle Three-Cylinder Delivery Wagon



Grabowsky Two-Cylinder 30-Horsepower 3-Ton Truck



Hart-Kraft Two-Cylinder 16-Horsepower Delivery



Martin Two-Cylinder 18-Horsepower Delivery



Rapid F 92C Two-Cylinder 35-Horsepower Truck

PANHARD: A. de Magnin, Assistant Manager American Branch—The Panhard car has always had the reputation of being the most durable and reliable one manufactured; the construction of the chassis is of the completest finish.

In purchasing a car of recent years the buyer knows that he can compare the weight with that of the lightest car made, and at the same time combining strength and comfort. He will get a motor silent, supple, and whose climbing ability is remarkable, as well as having the best in the market as to material, workmanship and design. In addressing himself to the Panhard & Levasor Company the prospective buyer deals with a firm which is the pioneer of the automobile business, and one that has acquired its experience by severest tests.

When buying a car the customer knows that he gets not only the best of automobiles and the most simple and complete chassis, but is also backed by a reliable firm. He knows also that he is buying a car which will last him for years, for, as can be seen in the streets of any city in the world, Panhard cars made ten and twelve years ago are still giving constant service and satisfaction.

Besides, we have reduced the prices of our chassis so as to meet American competition, making very little difference between the cost of a high-class American car and the Panhard, which has always been known as the highest priced automobile manufactured.

RENAULT: Paul Lacroix, Manager American Branch—Chief among the reasons why one should buy a Renault car, that is, an American, for on the other side reasons are not necessary, is the fact that this leader among French constructors has always sought for and catered to the high-class American trade. This tendency is distinctly shown in the list of 1910 cars, this including one special model designed specifically for American roads. It is a four-cylinder touring car with 25-35 horsepower engine. In this engine the long stroke has been particularly emphasized, the motor having a bore of 4 1/2 in., while the stroke is 6 1/2 in. This gives a ratio of 1 to 1.45, and as a result, the power developed by this motor is greater than other motors of similar bore, but lessened stroke. The construction of this special model for American roads is of itself an argument why one should buy this make of car. Other reasons are the unusually complete Renault line, extending from 8 horsepower up to 50-hp.

AMERICAN COMMERCIAL CARS

CHASE: A. M. Chase, President—The Chase motor wagons are built for delivery service in all classes of business. The goal of our designers is to eliminate all unnecessary parts and to produce a machine which will operate continuously with the minimum of care and expense.

Chase valveless two-cycle air-cooled motor most nearly approaches the ideal commercial car motor. The only moving parts are the pistons, connecting rods and crankshaft.

Chase motors use a system of mixing the lubricated oil in the gasoline tank and allowing it to feed to the motor in proportion as the engine uses gasoline. This not only insures perfect lubrication of the motor, but eliminates every particle from the mechanism in the lubricated system. The advantages of air cooling are well known. Delivery wagons must operate under all weather conditions, and it is a great advantage not to have any water system to leak and freeze.

Planetary transmission as used on the Chase cars is enclosed in an oil-tight malleable iron case which prevents any dust or dirt getting inside of the gearing and causing wear.

High wheel construction is very economical, as it reduces the tire expense to practically one-third of that of pneumatic tired vehicles doing the same amount of work. The large diameter wheels go over obstructions with less jar than small diameter wheels. The high wheels go over bad roads without injury to

the tires and with low power consumption from the motor.

Motor is located in front under the hood, and is easy to get at. Every progressive business man likes to have his delivery cars have a good appearance and a high-grade finish. The Chase motor answers this demand in every way. In this age many persons purchase their parts and assemble their cars in their own factory. The Chase motor wagons are built entirely in the Chase factory, and visitors to the plant are impressed with the thoroughness which is exhibited in all departments in the manufacture of the various parts which go to make up this successful delivery car.

GRABOWSKY: Grabowsky Power Wagon Company—The power plant in the Grabowsky, for good and sufficient reasons, may be removed and replaced within the fourth part of an hour. The work may be performed by a man of no great skill; the result is, in service, ten wagons, with eleven motors, make it possible to keep the ten wagons on the go constantly, and it is when they are on the go that they pay interest on the investment.

The Grabowsky idea is to build good wagons, and, what is equally important, to so design them that they may be maintained for years. This is brought about by having every bearing so made that it can readily be replaced by the man at the garage, and every time a bearing is replaced that part of the wagon is made as good as new. The replacement may be made at small cost, and the time required is but slight. In all other respects the Grabowsky method takes into account not first cost, but cost of maintenance, which is a matter of knowing how, then doing it that way.

GRAMM-LOGAN: B. A. Gramm, General Manager—We wish to state that in our exhibit in the coming Grand Central Palace Show we believe that the public can very easily see why we claim the world's best in the Gramm-Logan truck chassis. The reason why we make this claim is ten years of painstaking labor day and night by engineers grown up in the business, perfecting these chassis from a point of daily use in all parts of the country; the use of the very finest materials that have been studied to give the best satisfaction in the different parts of the chassis; a factory equipped with machinery built especially for our purpose, and with tools designed only for this work, and with plenty of capital back of us to properly carry out our work.

Our truck has features not to be found on any other, and every one of our customers in the past year reports the very finest of satisfaction. Our output in our present plant was sold up early, and we are rushing our new plant in order to take care of our business. The last reason why we claim the Gramm-Logan to be the best is because it is to-day the most widely copied chassis in point of design and construction on the American market, and is undoubtedly a year in advance of any other make.

RANDOLPH: H. E. Haase, Advertising Manager—The Randolph Motor Car Company has, with careful consideration of modern practice, as well as all innovations and radical tendencies, placed a line of cars upon the market which are evidently a strong combination of reliability, simplicity, strength and attractive appearance.

In accordance with the requirements of "Solid Tire Practice" the car is heavily proportioned throughout, and is designed to withstand all strain and racking effort of commercial usage. Ample power, positive lubrication and the governing of the engine speed are important features which have been given due consideration.

This concern has established agencies in all the important cities in this country, and have cars in the service of the best known concerns in the country.

NOTE—Many absentees will be noticed in the foregoing. Reasons Why One Should Buy, but the Editorial Department of THE AUTO-MOBILE takes this opportunity of stating that all had equal opportunities, and those who absented themselves did so from choice or neglect.

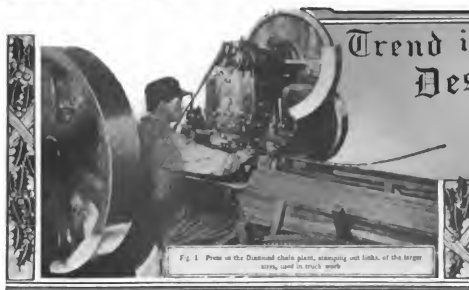


Fig. 1. Press on the Diamond chain plant, stamping out links of the larger sizes, used in truck work.

Trend in Design and Fashion

By
Thos. J. Fay

ers that machine tools as they were formerly made were not rigid enough for the purpose, and rather than slide back into the beaten path of indifferent success, pressure was applied to makers of machine tools, who happily, with ear to ground, measured

the impetus of the wave and responded.

It is the advance which has been made in machine tools and methods that holds the real story of the year, and when the patrons of the industry view the product of a twelvemonth at the Palace, the most interesting part of the things to consider will be in the mind's eye of the onlooker who makes himself familiar with the processes involved.

It is this very advance in process which serves as the substantial foundation on which the greatly increased output of this year stands, quantity, in fact, beyond the dreams of the men of a thrice of years ago, yet, with all, quality is on a higher plane than formerly, showing that precise method—in short, system—holds sway, among which the following are conspicuous:

CYLINDERS ARE JIGGED, MILLED AND GRIND

Accuracy, as it is represented by narrow limits of tolerance, is the modern requirement in cylinder-making, and this is accomplished with great certainty by utilizing mahogany patterns of good workmanship after drawings of competence, in which limits of tolerance are properly set forth, and in the foundry such care is given in charging the cupola and otherwise that the castings will be sound, free from surface blemishes, close-grained and of adequate strength. The most recent undertaking in this connection is by way of the introduction of a percentage of steel scrap in the charge, as in Premier practice, with special means of rendering the teeming mass amenable to the process. The castings thus evolved are especially close in texture, are fully 50 per cent stronger than normal cast gray iron, and come out of the moulds in such good fettle that few indeed are the "wasters" to be counted.

MULTIPLE HEAD MILLING PLANNER WORK

In many of the most modern shops, in view of desired speed and great accuracy, cylinders are placed on the planer bed, as many as 16 in a row, and having been designed with a view to the multiple milling of all faces (and further provided milling attachments to the planer), the work is conducted on a large scale, much as is depicted in Fig. 2. In this example, in view of other operations and conditions, the valve-cover bosses are left for a separate operation; otherwise all faces are done at one time, and owing to the accuracy of the equipment the process is quick.

JIG METHODS OBTAIN TO A VAST EXTENT

Having provided a suitable multiple drill, which in these days is the easiest equipment to procure, it is at once possible to provide jigs which will take the cylinders, hold them in the correct relation and enable the operator to advance the work with great speed, doing as many as 24 operations at one setting in some in-

FIRST PRINCIPLES are observed in the better plants of the day, and departure from them, if such there is, traces but the incident of the moment, and in plants undergoing organization, rather than in those of the A. M. C. M. A., which for the most part have stood the "acid test" as it were, having developed along pioneer lines, made haste but slowly, scanned the horizon for the sight of breakers ahead, which were rendered impotent by the simple process of steering clear of them.

In the display of automobiles, accessories and parts which is about to be inaugurated, and which will be viewed by a waiting concourse, beginning December 31, at the Grand Central Palace, there will be seven long days at the disposal of interested spectators in which to gorge themselves with imprints of the good points abounding in the products. In this display, however, little will be found which will tell of the processes, and, since a stream must have its headwater, so must this display emanate from a competent source, which is brains, brawn, system and facilities.

Of the brains and brawn little need be said; in America these qualities are indigene. System is but the expression of consolidated experience, there being now a plenty, while for facilities let us make them the gist of this subject and revel in them for a pace, measuring their depth and width and breadth.

Hindrances and Facilities Separated.—Makers of automobiles, remembering the hindrances of the older industries, carefully avoided them in the newer work, and in so doing located plants at points of vantage, adjacent to trunk lines, waterways, and in juxtaposition to materials of the desired stamp.

Hindrances, as they relate to labor, come when the class of work to be done is different from the habitual undertakings of a community of laborers, and this phase of the problem has been adequately cared for, which gives to makers of automobiles a class of artisans in sufficient force to render conspicuous services.

Sanitation, light, heat, and pleasant surroundings, while they may be as strangers in certain industrial establishments, have been most carefully utilized in the newer plants, notably those designed for purposes of turning out automobiles, and, strange as it may seem to some, the quality of product increases with the output under such conditions.

Special Machine Tools Developed to Order.—In kinetic machines, such as automobiles, alloy steel is necessary in many of the more important parts, and even the components which are fashioned from the more ordinary grades of steel are made from materials of better selections than would be true in many other genera of machines. This advance in the rigidity and dynamic ability of the materials used soon rendered manifest to build-

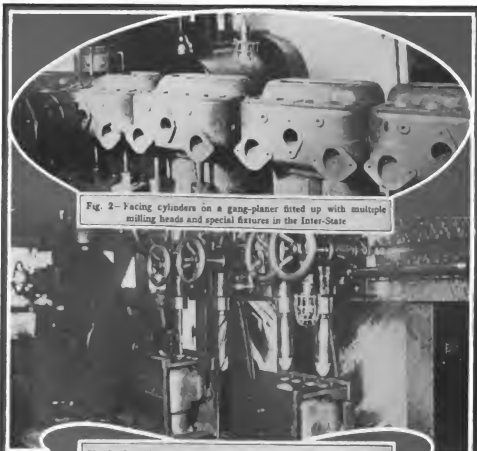


Fig. 2—Facing cylinders on a gang-planer fitted up with multiple milling heads and special fixtures in the Inter-State

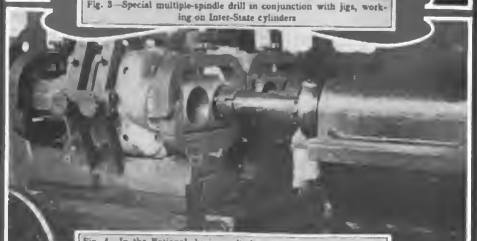


Fig. 3—Special multiple-spindle drill in conjunction with jigs, working on Inter-State cylinders



Fig. 4—In the National, boring cylinders on a special tool, holding four sets of twin-cylinders on a turntable



Fig. 5—Heald cylinder grinding machine, as used in connection with National cars, with water jacketing to defeat expansion

stances. Fig. 3 is of a good example of this character of work, and the illustration seems sufficiently comprehensive to show.

BORING DONE AT HIGH SPEED

Referring to Fig. 4, of a twin boring bar used for working out the bores of cylinders, it will be seen that enough cylinders for two motors are placed in the fixtures at one time, and the cutters on the two spindles (having inserted teeth) are of high-speed steel and capable of being pushed to the limit. When two bores are completed the table is feed across and the second set of cylinders are then bored. When these cylinders are finished the table, turning on its axis, is swung around and the cycle of operations is repeated as before. While this work is going on the workman places other cylinders in the fixtures which are idle, and in this way the performance becomes continuous. When the work is pushed very hard, and in the absence of any method of holding a constant temperature, the bores will be distorted quite a little, and in some plants it is the custom to "age" the cylinders and then subject them to a second boring operation.

GRINDING IS ALMOST UNIVERSAL

The Heald grinder, as shown in Fig. 5, is seen in almost every automobile plant in America, and, as the illustration clearly indicates, a fixture is available for holding the cylinders while they are being ground, it being a simple angle-plate, to which they are bolted after the flanging face is finished. Since there is but one spindle, and two bores to be ground, a means is provided for feeding across, in order that the second bore may be ground. While grinding cylinders water is circulated through the jacket and in this way the bore is finished to great accuracy, since expansion due to heat is abated.

Modern Trend in Cylinder Designing—Cylinder designing may be placed in the classes as follows:

(A) Valves in the head-air and water cooling being in vogue.

(B) T-shapes, noted for symmetry—water cooled.

(C) L-shapes, eliminating the need of one camshaft water cooled.

Valves in the head are much more in vogue than formerly, there being no question of the ability of this type to deliver the maximum power, which accounts for the type being used in racing to a considerable extent.

T-shapes are holding their own; they assure absence of unequal expansion, but demand a somewhat

larger radiator in the cooling process, due to a considerable increase in the flame-swept surface.

L-shapes, because they eliminate a camshaft, are favorites, and as respects unequal expansion, they do not give trouble. The flame-swept surface is somewhat more than in the types with valves in the head.

PISTON AND RING DEMANDS

Owing to the demand for higher weight efficiency in motors, and in view of the influence of weight of the reciprocating parts on the secondary moments limiting power by limiting safe speed, it is the most pronounced idea at the present time to employ very superior grades of piston iron, which to be sure are the product of gray iron foundries, but the castings are white in their tendency, taking on, strange to relate, such characteristics as abound in stove castings—the average person laboring under the mistaken notion that stove castings are inferior. As to rings, what is true of pistons also holds good, and to a considerable extent, although for them to be fragile is to reduce the value of them to near zero. As for connecting rods, since they belong to the reciprocating mass, they must be coped with simultaneously, and in the best practice of the day they are made of rather rigid drop-forged steel, in I-sections for the most part.

MACHINED ON SPECIAL TOOLS

Nothing can serve better to illustrate the methods in vogue than the illustration here afforded as Fig. 6, it being a turret lathe, provided with a special tool-post and cutters to suit. The piston is first bored out, and with this bore to go by the piston is fitted over a mandrel, which is screwed onto the lathe spindle, and the grooves, as well as the exterior finish, are done as a single operation. From this tool the pistons are sent to the grinding department, where they are sized and closely finished.

PISTON RINGS DEMAND GREATEST CARE

Piston ring stock comes from the foundry in the form of a cast-iron tube of the required length and thickness of wall to turn out the rings of the right size, and enough of them to complete a motor, there being, as a rule, four rings to the piston, making 16 rings for a four-cylinder motor. After the tube is turned to near size, in as well as outside, it is slipped over a mandrel, as shown in Fig. 7, and the operation of parting is conducted, leaving each ring with grinding "finish."



Fig. 6 Special turret lathe, in the Inter-State, working on pistons, turning, grooving, and facing simultaneously

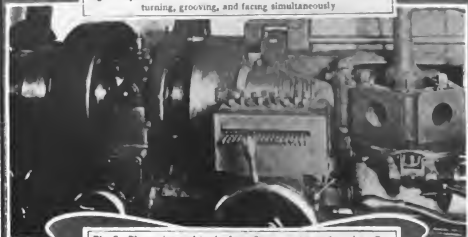


Fig. 7 Piston ring tool in the Inter-State, turning and cutting off as a continuous performance



Fig. 8 Magnetic chucking flat grinder working on piston rings as used in Inter-State cars

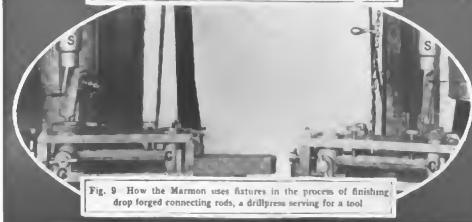


Fig. 9 How the Marmon uses fixtures in the process of finishing drop forged connecting rods, a drillpress serving for a tool

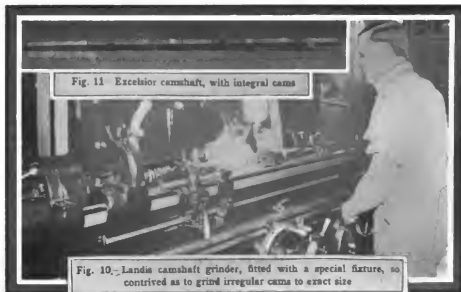


Fig. 11 Excelsior camshaft, with integral cams

Fig. 10 Landis camshaft grinder, fitted with a special fixture, so contrived as to grind irregular cam to exact size

RING GRINDING ACCURATE

After the rings are parted they go to the surface grinder, fitted with a magnetic chuck as depicted in Fig. 8, where they are placed on the flat (magnetic) chuck and the grinding disc passes over the surfaces as many times as may be demanded to bring a true, polished surface. When the side is finished the rings are turned over and the same operation is repeated; in this way the rings are brought to within a small fraction of a "thousandth" of dead accuracy, involving a free fit, and with the grooves properly sized in the pistons there is no question of the results; the pistons will hold compression. It is the practice this year to more carefully fit rings than it ever was before, and the power now realized is in a large measure accomplished.



Fig. 12 Grinder used in the Woods plant for work of an exacting character, as fitting ball bearings, etc.



Fig. 13 -Grinder used in the Rambler plant for finishing crankshafts to exact size, they having four throws in this case

CONNECTING RODS ARE MILLED

Referring to Fig. 9, it will be noted that a straddle mill is set to face off the enlargements, they being clamped in place for the purpose. There are several forms of fixtures in vogue, and in some of them provision is made to turn the connecting rods end for end, thus allowing the work of facing off the enlargements at both ends to be done at a single clamping. In some shops the fixtures contrived for this purpose are very ingenious, being so made that the pistons are locked in and come in the right relation automatically, with relatively small expenditure of time.

ANNEALING IS NECESSARY

Connecting rods, being drop-forged, are not of necessity in good fettle when they come from the forge, and in the better grade of motors they are subjected to a correcting process before

they are machined. This is but a matter of annealing at the right temperature for a certain length of time; true, it is desirable to check the grades of material, it being the case that if the carbon is too high the results will not be so good. Sand blasting is resorted to rather than pickling this year, and the experience is that this process is superior; it takes less time, removes the skin, and discloses the metal to the eye of the inspector, who, after a little skill, is enabled to determine conditions.

CAMSHAFTS MAKE ADVANCE

Irregularity in the contour of cams and difficulty involved in accurately shaping them has led to many innovations in the process, and even to this day, for divers reasons, some of the representative builders of motors prefer to use separable cams, which they fasten on in one way or another. Fig. 10 presents the newest and perhaps the most advanced possible way of doing this class of work, in which a special grinding fix-

ture is attached to a regular type of grinding tool. The finished camshaft is as shown in Fig. 11, which was made for a motor with four cylinders, of the L-headed variety, thus requiring eight cams to the shaft. The cams are cut integral—that is to say, with a drop forging to start with in which the cams appear all near size, and after roughing between the cams, which is done in centers on a lathe, the camshafts are hardened and then set up in the grinding attachment on the grinder as shown. In this work the attachment is located eccentric to the fixed centers of the grinder, and by means of master cams, which are just like the cams to be finished (but on a larger scale), the camshaft shifts on its eccentric centers exactly to conform to the surfaces to be ground, thus making it possible to grind the cams, no matter how they may be shaped for the final finish, or



chine tools (especially in grinding processes), this phase of the work is being done to a nicety.

Crankshafts Almost Invariably Ground—These important members in motors are machined to within about ten-thousandths of the final size, both at the main bearings and the pins. They are then set up in centers on grinding machines, as illustrated in Fig. 13, where they are reduced to exact diameter less a fraction of a thousandth of an inch above size. The result is that the sizes are not only neat, but elliptical formations are avoided. It will readily be appreciated that an elliptic journal is scarcely likely to improve the journal-box in which it must run.

Surface Grinding Now a Settled Method—There are many operations of an important nature, connected with motors in particular, which can best be performed on a surface grinder of a type as depicted in Fig. 14, and in some instances a magnetic chuck is added, in order to save time in the setting up of the work. The particular job being done does not demand the use of the magnetic chuck, and it is eliminated in this case. The grinder is facing off the fittings of a manifold for a motor, and when such nice work is done it is then that "packing" may be omitted, and few indeed will fail to rejoice at the omission.

Internal Grinding Just as Handy—Besides the several classes of grinding to which specific reference were made, there are the several kinds of internal grinding done, and the little grinders which do this work are largely responsible for the lack of noise that makes cars of this time so conspicuous when they run as companions down the roadway alongside of some of the older but more noisy models of a year or two ago.

USES OF MULTIPLE SPINDLE DRILLS

Expensive special machine tools in many of the shops account for the quality of the work done, but it is not absolutely neces-



Fig. 16—Multiple-spindle drill as used in the Marmon plant in conjunction with a jig for crankcase work

how hard they may be. It is of the greatest advantage to thus be able to do the grinding after the camshaft is hardened, for in this way the effect of deformation is not so much of a trouble to cope with. The cams thus made are less expensive, may be of harder material, and the time required in machining and finishing is much reduced. Accuracy in timing is assured since the cams are ground to conform to the master, which master cam can be made to exact size by a toolmaker of skill.

GRINDING IS GENERAL ON THE INCREASE

In almost every shop, as never before, grinding is resorted to to a vast extent, and Fig. 12 is indicative of the advantages to be derived, in which a differential housing is being trued up by the grinding process after it is finished. This truing up process, as well as assuring concentricity, has the advantage of affording a "sucking fit" for the annular ball bearings used in this product. It must be well understood that ball bearings, however good they may be, will not afford complete satisfaction unless they are nicely mounted, and in the products of the year in view of advances made in ma-



Fig. 16 At the National, showing a special application of a radial drill, with a special fixture, boring three rows of bearing holes at one time



Fig. 17—Drillpress, with a special, suspended, fixture, drilling holes in Marmon live rear axles

sary to use them, nor will the quality of the work done fall below a desirable standard in the absence of them—in fact, in the shop it is true that “fine feathers do not necessarily make fine birds,” so to speak, referring to machining processes.

Multiple-spindle drills, in conjunction with accurately made jigs, are of the greatest utility, the quality of the work done being as accurate as drilling and reaming can make it, and that the holes, bores and finishes will come right is assured by the accuracy of the jigs used to guide the cutting tools. Fig. 15 is of a multiple-spindle drill of the latest and most useful type, in which the reamers T₁, T₂, T₃, etc., are guided by the jig G₁ into the proper places in the crankcase C₁ and the work is quickly and accurately done. Universal joints, J₁, J₂, J₃, etc., are responsible for the manner of transmitting the power to the respective tools; compactness is prominent, and toolroom accuracy is self-evident.

Radial drills come in very handy in many undertakings, and under the guidance of men who understand the jig and fixture requirement the result is on a high plane. Fig. 16 is indicative of the highest attainable result, in which a radial drill is used in connection with a fixture which carries three boring bars, they being so geared and related as to serve to bore the bearing holes all at one time

with great accuracy, in a crankcase, at small loss in time.

Perhaps Fig. 17 is the most ingenious of all; it is of a drill press of the conventional sort, in which the work is a live rear axle A, suspended by the balancing arm B, and the jig G guides the drill D through the bushed hole H, the balancing arm B being suspended by the rod R. It will be noted that the axle is held in the jig by the spindle, which fits in the round of the jig.

What the automobile has done for machine tools is more than will be fully appreciated, and at the present time, in view of the demand for men of great skill, the industry has absorbed every available toolmaker, especially of the class capable of coping with the very problems as referred to in connection with the fullest use of standard machine tools as the drill presses as here presented.

APPRENTICE SYSTEM BEING REVIVED AND EXTENDED

Owing to a growing scarcity of competent labor and with a view to training up a special class of men, they to be skilled in automobile work, the various systems of apprenticeship are being investigated and some of them are being tried out at length. One of the best possibilities lies in the co-operation of the companies with trade schools, in which it is the aim to take the boys on part time and pay them for the work they do, thus helping them to go through school and at the same time learn a trade. That these boys will fill a useful part in the building of automobiles in the near future is fully believed by all who take an interest in this phase of the problem.

PRESSED STEEL PLATS AN IMPORTANT PART

Looking backward for several years discloses no such advance over any other year made during the past twelve months when reference is had to pressed steel work, as sidebars, crossbars and other parts as used in chassis frames, and in other important parts, namely, brakedrums, brackets, shields, etc.

In the production of sidebars, especially those of the kickup design, and when they are spread as well, the presses are required to be very large and substantial, one of which is here portrayed as Fig. 18, in operation, pressing a sidebar of the character as employed in the manufacture of chassis frames.

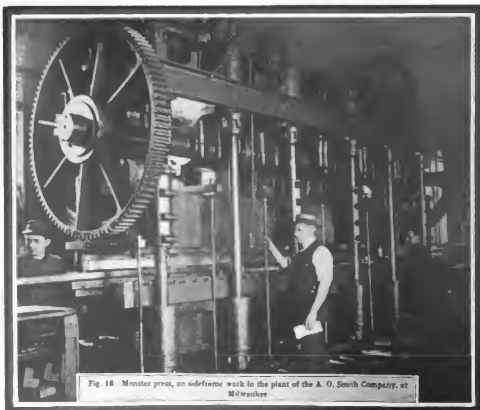


Fig. 18—Monster press, on sidebar work in the plant of the A. O. Smith Company, at Milwaukee



Fig. 19. Bulldozer, as used in the Rambler plant for pressing crossbars and other parts of the steel

Bulldozers Coldpress Crossbars—Unless chassis-frame crossbars are very intricate in shape they are coldpressed in bulldozers, one of which is here presented as Fig. 19, and, as will be observed, half of a die placed against an abutment, the latter formed from the mass of metal in the frame, and the pressure needed is obtained by double sidecranks, which connect to a crossmember which carries the other half of the forming die. Power is utilized in driving the bulldozer on a considerably less scale than might be supposed, due to the work coming on for a part of the revolution only, and flywheel effect is taken advantage of to accumulate energy, the same to be expended when the work is being pressed. When the shapes are very intricate, or if the material used is alloy steel, as it is in some crossbars, the work is done hot. The bulldozer in the shop is responsible for the elimination of castings in automobiles to a considerable extent, and this particular size, besides pressing crossbars, is used for many other purposes as well, one of which may be seen in the figure, in which the particular operation consists of bending a piece of drawn steel tubing for use in fitting up a motor.

Vertical Types of Presses Lend Facility—Perhaps there is no better application of a vertical type of press to be had than the one shown in Fig. 20, which is doing broaching work; broaching a square hole by pressing a broaching tool through the round hole in a part to be so fashioned. Broaching square holes to any great extent is a modern idea brought about by the coming of the automobile, in which there are several square shafts, notably in the transmission, in connection with the sliding gears. In this particular case, owing to the power of the press the broaching is done with great speed, and by the use of special high speed steel in the broaching tool it is made to sustain, even though the tool is pressed through a considerable mass of material to be removed, and at a rapid rate.

Hydraulic Press Has Many Advantages—The hydraulic press shown in Fig. 21 is operated on flywheels pressing one on to the crankshaft, the shaft being tapered to receive the flywheel, and in the process the press applies a force of some fifteen tons, the exact pressure depending upon the accuracy displayed in the machining process. In this class of work the press is the best inspector possible to employ, for if the pressure falls below a certain point it will be appreciated that the fit is below the requirement; likewise, if the pressure goes up too much there is danger of splitting the hub of the flywheel, so that in all truth the man at the press is one of more than a little intelligence in the shops that do the better class of work. This is an excellent illustration of working on a large scale.

HEAT TREATMENT AUGMENTS KINETIC QUALITIES

In visiting the plant of the Diamond Chain Company, at Indianapolis, Ind., opportunity was afforded to note something of the extent to which qualities in steel were accentuated in heat

treating. In side chain drives, which are on the increase, by the way, due to the large number of the better class of runabouts and other small cars, which are being put out with chain drives, not forgetting that trucks, now being built in quantities, almost invariably use chains, opportunity is afforded to bring the material used up to the highest possible state, partly due to the necessity of using high kinetic material, and again in view of the shapes of the parts, which lend facility in the process.

In this work, as it is conducted at the plant above named, the process of heat treatment is carried on in a large way, and Fig. 22 presents a corner of the room showing a battery of "salt" furnaces, they being used for the better grade of work, especially in annealing. Fig. 23 shows cementing furnaces, of which there are a large number, they being used to give a depth of carbon, the same having the facility of rendering the surfaces glass hard, leaving the core soft—so soft, in fact, that it is highly kinetic and acts as a cushion for the shell.

Instruments of Precision Guide the Artisans—Referring to Fig. 24, Pt is a pyrometer, used to determine the temperature prevailing in the respective furnaces, St is the electric switch used to connect up the pyrometer, R1 and R2 are rheostats used to regulate the voltage of the circuit in calibrating the pyrometer, T1 is a thermometer used to determine the temperature of the baths, T2 is a thermometer which gives the surrounding temperature, and Pt is a pressure gauge which reads pressure of the circulating air, which is of the greatest advantage in refrigerating and mechanically agitating the quenching baths, they being heated up by the heated parts when quenching is being done and it being necessary to maintain the temperature at a constant level, it being also desirable to brush off the globules of steam or vapor of oil, as they adhere to the parts; this desirable operation is brought about by agitation of the liquid, which transpires when the compressed air is liberated below the surfaces of the bath.

ECONOMIES FROM TWO POINTS OF VIEW

Instead of economizing by purchasing inferior materials for use in parts, it is now the practice in the plants of note to



Fig. 20. In the Rambler, broaching square holes, using broaching cutters in a vertical press, working at high speed



Fig. 21 Pressing flywheels on to crankshafts, using about fifteen tons pressure and a hydraulic press

economize in divers other ways, as in the use of material and by stopping of wastages.

Fig. 25 presents a corner in the plant of the Diamond Chain Company where product is weighed, the platform scales S1 being used for the purpose, and as the chips and turnings accumulate they are put in the separator O1 if they are small, O2 for other grades, and the large turnings go into the separator S2, where the entrained small parts are separated out and all lubricating oil is taken away, leaving the turnings dry and delivering them into a

bin which is placed outside the building adjacent to the roadway, so that the delivery of this product is cheaply and promptly made. The recovered oil from these separators is used over and over; it represents a large item, and the value of the turnings, chips, etc., is reduced to the right level.

MULTIPLE WORKING OF OPERATIONS

One of the very distinct ways by which quantity is being turned out without reducing quality lies in the utilization of machine tools which have been so contrived that a plurality of parts

are finished at one time. Fig. 26 of a multiple operation shows a gang of saws cutting off "blocks" as used in block forms of Diamond chains, delivers 27 blocks from the bar at one time and in about three minutes; this is certainly high speed, especially considering the dense quality of the material used in these chains.

Continuous feeding makes for output, and the quality, if anything, is improved. Fig. 27 shows a specimen of this class of work, in which a hopper H1 is loaded with links which feed down on to the revolving platen P1, on which the operator places the rivets from the tote pan R1 and the process of assembling is continuous; this is one of the many tools of this character which makes sprocket chains possible, it having been worked out in the plant of the Diamond Chain Company in the manner as here shown.

FEMALE LABOR IS NOW BEING UTILIZED

To a greater extent perhaps than is generally realized female labor is taken advantage of in the several plants. There seems to be no limit to the work that can be placed in the hands of competent working women, and Fig. 28 is illustrative of the point to be made. In this instance a long line of buffing and polishing machines (only one shows) are doing the fine finishing work on chain parts in the Diamond plant, and from information at hand it is apparent that this venture is an entire success. In almost every automobile plant, especially where tops and upholstery is done, women take a hand, doing much of the better class of work to be seen in the artistic creations of the present day.

MACHINE MADE WHEELS MUCH ADVANCED

In the earlier attempts to make wheels of wood by machinery they fell below a certain standard, partly due to lack of completeness of method, and again in view of a certain hostility on the part of wheelwrights, they having the erroneous impression that the growth of machinery for this class of work would belittle their efforts. Fig. 29 depicts the process employed in truing up wheels, in which W1 is the wheel on the vertical spindle S1, and the abrading disc D1, being rotated by means of power furnished by the belt B1, sands off the high spots, bringing the felloes down to the right diameter for the rim. If the wheel is out of true, a point now regarded as fatal to good results, the plate S2 will show, and the operator governs himself accordingly.

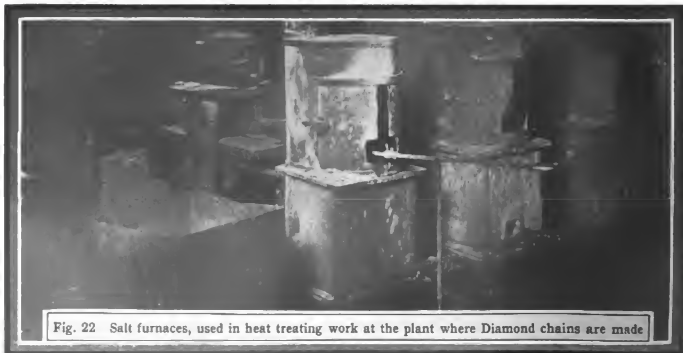


Fig. 22 Salt furnaces, used in heat treating work at the plant where Diamond chains are made

NOISELESSNESS IN GEARS NOW DEMANDED

In former times it was the rule to reduce noise produced from gears as much as possible and then explain to the purchaser that noise, to some extent, was to be expected. This year things are different; noise is eliminated and silence reigns. How this was brought about is a long story to be sure, but it is worth a moment here to intimate something of it.

In some plants, and in dealing with bevel drives in order to eliminate noise, they are annealed between every forging operation, machined exactly to size, then copper-plated before being gashed and very carefully cut, using the Hugo Bilgrim or other refined methods, by which the teeth are accurately planed to the theoretical right shape. The copper plating which is done before the teeth are cut serves as a shield, preventing the carbon from penetrating below the surface in the cementing process, excepting where the copper plating is afterwards cut away, and as a result the cementation is limited to the very surfaces which are to be rendered hard. The advantage in this is noticed in subsequent treatment, when it is the aim to harden the teeth and at the same time prevent warping. Deformation is but slight, if any, under these conditions, and noiselessness is the result.

When the gears are all made for any given lot they are then measured and a process of matching up is entered into, it being the desire to ascertain by actual trial in a measuring machine the most noiseless condition, and by matching up this condition is arrived at.

While it is true that noise is reduced to almost a mere suspicion when the gears are well cut, provided the spiral-tooth formation is used, and especially when the "herringbone" idea is incorporated in, even so, no matter how well the work is done, or what the shape of the teeth may be, if the pitchline velocity is beyond a certain speed, noise is likely to be generated, and under such conditions, in order to eliminate the noise, the gears are "lead."

The process of leading is best carried out when the flange (below the roots of teeth) are undercut and then filled in by casting a rib of Babbitt around the inner periphery of the gears. This layer of Babbitt, even though it may not be so very thick, will kill noise most effectually. To show something of how this work is carried on, reference will be had to Fig. 30, of a battery of gear cutters, and Fig. 31 is assembled transmission units, as taken for the author at the plant of the Warner Gear Company.

In going through the several plants and in discussing the matters with makers of machine tools, the conclusion is reached that the automobile has modernized processes to a vast extent, and among the builders of note, principles are very much alike. Fig. 32, for illustration, presents a method of broaching square holes in sleeve gears, the process being rapid and accurate. In spiral half-time gear

making, the idea being to eliminate noise, the gear cutters are of the highest order of merit, one of the finest examples being that as shown in Fig. 33, as used in the plant of the National Motor Vehicle Company at Indianapolis, Ind.

SHOP TRANSPORTATION BEING LOOKED AFTER

While traveling cranes are used to some extent, especially in the plants devoted to the manufacture of high-powered motors, even so, considering the run of automobile plants and the fact that the largest units weigh less than 1,000 pounds as an outside figure, other methods obtain for the most part. Industrial railway systems using the "Hunt" narrow-gauge standard of track building, which is 21 inches, with a scheme by which the longest cars are capable of rolling around a curve of 12 feet radius as easy, according to C. W. Hunt, "as a wagon rolls around a corner."

These tracks come made up, and are laid flush in the concrete floor, hence serving their useful purpose without impediment of



Fig. 31 - Pre-cutter, hardening, finishing, pre-narrow-gauge, and other equipment used in heat treating Diamond chains

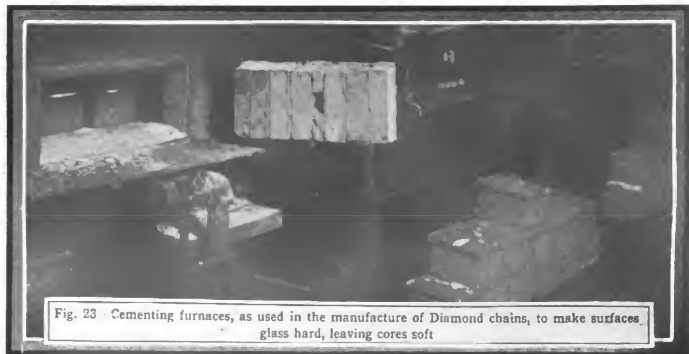


Fig. 23 - Cementing furnaces, as used in the manufacture of Diamond chains, to make surfaces glass hard, leaving cores soft



Fig. 33. Special gang saw cutting off 20 blocks at one time, as used in Diamond block plant.

any kind, and the cars, as usually made, come in several lengths, ranging from 6 to 14 feet over the platform. The cars, being designed for easy pushing when loaded, are mobile in the extreme, even when being pushed with a full load by a single laborer. Tote pans made of pressed steel are used to keep the work separate, especially the small parts, and these pans are loaded on to the cars as the operations are completed, when the laborer pushes the cars along to the point of delivery. Small electric locomotives are also available for use in the larger shops.

Other Methods of Transportation in Vogue—Besides tracks and cars, there are systems of overhead trolleys by means of which motors are picked up and whisked along, one of which is being used extensively in the Rambler plant at Kenosha, Wis. Then there are portable pulley block cranes which do excellent work in motor assembly rooms, one of which is illustrated in Fig. 34, which is a type as made by the Cameron Engineering Company, New York City.

In some of the larger plants, adjacent to sidings, tracks are laid right into the shipping departments, and as a general rule the siding passes by the receiving room. This is a positive advantage in that materials may be landed on the floor, under the crane, or beside the equipment used for moving materials in the shop. The overhead charges, which must go against the output cost, whether it be automobiles, parts, or accessories, will be less in the plants which are fitted out for good transportation than will be true of

the remaining plants, and this year, if signs count, every effort is being made to keep down overhead charges and put additional quality into automobiles. The cost of selling an automobile is lower when the quality is superior, and it is in the cost of selling that economies will have to be made.

SANDBLAST TAKES PROMINENT PART

In former times, owing to the habit of keeping in a groove, which according to competent authority differs only from a grave in that it is longer, pickling was practised almost to the entire exclusion of sand blasting and drop forgings, for illustration, were frequently neglected. In the course of time, due to protracted investigation, it has been found that even the very best drop forgings may not be relied upon unless they are given a critical examination, even when annealed, and in the absence of annealing they lacked requisite qualities to a marked degree.

This year as never before drop forgings are in vogue, and they being turned out in vast quantities, the question of annealing became of even more importance. Nearly every up-to-date maker of automobiles therefore, besides installing an annealing battery, added a sand blast in order to be able to quickly remove the skin of the forgings, thus enabling the inspector to see the surfaces and to note if they are free from blemishes. There are other important advantages to be attached to this question of sand blasting, as, for illustration, the parts anneal better and surface strains are thus removed more readily.

ANNEALING DONE IN DIVERS WAYS

When parts are at a high heat, if they are then exposed to the atmosphere they will oxidize, and in order to avoid this when annealing, in some of the well-equipped plants, the parts are placed in a "gas" annealing oven, in which illuminating gas is allowed to enter, thus driving out the atmospheric air, with its oxygen, hence oxidization is prevented and as a result the forgings are less troublesome to finish, and, besides, they have a better look. In sidebars, as used in chassis frames, this is an important matter owing to the thin metal used in them, thus making it undesirable to have any of the metal oxidized away, as it would be were the annealing conducted in the open air.

In quenching baths, in order to maintain them at a constant temperature, which is desirable, they are cooled by allowing compressed air to enter, having the

compression up to the refrigerating point, which is above 60 degrees Fahrenheit, and the same air, since it agitates the liquid, drives all bubbles of vapor from the surfaces of the parts undergoing quenching, and the results are far more uniform. This method is used to excellent advantage in the plant of A. O. Smith Company, at Milwaukee, Wis., in the process of making chassis members, which class of work is done on a tremendous scale at this plant.

PRODUCES GAS PLANTS USED

Power to run the large plants devoted to the manufacture of automobiles represents a large item in the overhead costs, and in the West in particular producer gas plants, utilizing gas engines, are rapidly taking the place of steam engines, boilers and their accessories. The plant of Wheeler & Schebler, makers of Schebler carburetors, at Indianapolis, Ind., is run in this way, and with the new addition, which is now well under way, a large pro-



Fig. 25. Economy inducing equipment, used at the plant of the Diamond chain to recover oil and dispose of turnings.

ducer extension is being made, which is evidence of satisfaction given by the old plant. At the new plant of A. O. Smith Company at Milwaukee a very extensive producer battery is being installed, the entire and only source of power being from a producer system. Power of this sort is also used at the extensive plant of the Rambler, at Kenosha, and as a matter of fact there are divers other illustrations of this growing method of supplying power, in which the space required, labor of maintenance and fuel consumption seems to be lower than that possible when conventional steam methods obtain.

INSTRUMENTS OF PRECISION DEPENDED UPON

Interchangeability of parts, being the far cry, demands precision of method, and this in turn must be at the expense of instruments, facilities and the class of men who appreciate their proper use. Makers of measuring instruments, appreciating this, have produced for such use divers instruments, all of micrometer characteristics, and in many instances the principle of the

"extensometer" is embodied by means of which the ten-thousandth of an inch may be read off as readily as it was before to read to thousandths. These instruments, in conjunction with jigs, fixtures and method, such as illustrated in this article, has done more to make automobile parts interchangeable than any one thing excepting the demand of the American autoist for first-rate automobiles.

ROAD TESTING VALUE

Some of the companies give the cars made an actual road test of approximately 100 miles, and in this test it is the aim to abuse the cars, thereby breaking any parts which may not be up

to the required strength. This test is in addition to such shop tests as are required to render the product uniform in character. In other plants, due, in a large measure, to a difference of opinion as to the value of a road test, this abuse test is dispensed with and every effort is made, in the shop, to fix the standard of quality, even to the extent of testing every lot of material used, to quite some extent, in the laboratory.

The mere fact that an abuse test is given is not, insofar as can be seen, reason for slighting the shop tests, nor is it believed that the companies who do resort to the abuse test slight the other methods. Of the plants visited, those which practiced the road test of all cars made, also run a laboratory, and that laboratory methods obtained to a vast extent was seen. Whether or not the road test is desirable is a matter that must be settled in time, yet even so, it does seem as if trouble, if such there is, should fall to the makers, which it probably will if a rigorous test of 100 miles is actually made under severe road conditions.

ELECTRICAL TRANSMISSION OF POWER

As never before, the transmission and distribution of power, in the shops, to the respective machines is being accomplished by utilizing electric motors, and in many of the most important cases individual motors are being much used. As a rule, how-



Fig. 28—Women, occupy a place of worth, performing responsible operations, in the manufacture of Diamond chains



Fig. 27 Special assembling tool, fitted with a hopper, by means of which the work is fed continuously in assembling Diamond chains

ever, with a view of realizing a good average efficiency, at a reasonable first cost, mixed systems of distribution prevail, in which groups of kindred machine tools, as drill presses, for illustration, are run from a countershaft, and this shaft, in turn, takes its power from a single electric motor.

The power house, for divers reasons, should be placed at a



Fig. 29 Modern wheels to be true, and to size, are trued up in a machine as here illustrated



Fig. 30 Bank of gear cutting machines in the plant of the Warner Gear Company, of which there are many

distance from the main buildings, and this is rendered possible when electric methods of transmission are taken advantage of. With the power house at a distance the fire hazard is eliminated to the extent that if a wing of the main buildings is lost, the power plant will be intact.

In the power plants, as they are being fashioned, if steam is used, coal is handled economically by means of stokers, and the labor item, as well as certain labor complications are placed below a shut down for lack of power. The electric wiring systems, to the greatest possible extent, are run free of the buildings, it being the idea to abort an interruption of service in the balance of a plant if, perchance, a wing should take fire.

Direct Current Most Used—In the distribution of electrical energy for power purposes, the several electrical problems have been worked out to a high state of efficiency, and, while alternating-current work is, to some extent, to be seen, yet even so, users seem still to have a strong preference for direct-current motors. If the power is taken from a central station, which, in some cases,

is true, the source may be alternating, but, in the shop, rotary transformers are then employed and the motors remain direct current.

The power actually used by a considerable number of motors, as distributed in a shop, is far below the total of the motor ratings. It has been found that the source of electrical energy, as the dynamo equipment, will scarcely have to be more than about 25 per cent of the sum of the ratings of the motors used in the plant, even assuming that each motor is loaded to its full capacity at times during the day. This is an important point well worth taking into account when plants are being installed, and, while 25 per cent is not exactly right, yet even so, the worst condition is scarcely above 33 per cent; the exact percentage depends upon the number of motors and the total power capacity of them.

In determining upon the extent to which individual drives should be indulged in, the several automobile builders consulted their pocketbook to the extent that the first cost is higher, and, having satisfied this phase of the problem, they then considered that a machine, if it requires less than one horsepower, maximum, to run it, might well be grouped, as a rule. The commercial efficiency of a motor, if it is wound for less than one horsepower, is considerably below 75 per cent, and, economy being the great factor, the commercial efficiency of the motors must be considered.

How Fire Risk Effects Parts Plants—When an automobile maker places an order for parts he is much concerned about deliveries, and since all contracts terminate with a fire, it is up to the purchaser to place his orders with the class of parts makers best protected against fire. Some companies, when considering the placing of orders for parts or accessories, indicate a willingness to pay more if the fire risk is reduced to near zero, as it is in many cases. In other cases it is the settled policy of the companies not to place an order unless the building in which the work is to be done is absolutely fireproof. The Timken Roller Bearing Company, for illustration, is authority for the statement that none of its materials, as used in its products, is purchased from any source unless the building in which it is made is absolutely fireproof and a sprinkler system is installed.

Saw-tooth Buildings are Fireproof and Light—Many of the most modern plants devoted to the making of automobiles are of the saw-tooth variety, or variations thereof, and modern cement construction. Good examples of these types of building will be found at the Inter-State, Hupmobile, Rambler, Mitchell, National, Oakland, Pierce, Premier, and others. One of the very largest,



Fig. 31—Lot of transmission gears ready to box and ship from the plant of the Warner Gear Company

and perhaps, the most imposing of the newer buildings of the year, is that of the A. O. Smith Company, at Milwaukee, which is about ready for occupancy, and will be devoted to the production of chassis frames and parts, also transmissions, steering gear, brake drums, and, in fine, everything that pressed steel will shape up to as used in automobiles.

USES OF AUTOMOBILE TYPES OF MOTORS

Besides the regular use to which the automobile motor is put, in propelling automobiles, and, not mentioning aerial propulsion, there is still another zone of activity which it is expanding at a very rapid rate. Prior to the advent of the automobile, attempts were made to run plants and do electric lighting, using gas and gasoline types of internal combustion motors in the process. The motors, while they run with a certain ratio of facility, failed, for the most part, owing to interruptions in service, which seemed unavoidable, owing to the lack of good control of the motors.

This last year, as it seems, particular advances were made; motors, for stationary work, are more nearly in accord with practices in automobile engineering, and in many of the plants devoted to the manufacture of automobiles or accessories, internal combustion motors are employed, in some cases for power in general, and in many instances for lighting, in which the lighting dynamo is driven by a four-cylinder automobile type of gasoline motor. True, in the better examples, as at the plant of Wheeler & Schebler, at Indianapolis, the gasoline is eliminated and a suction producer system of gas making is used instead.

In view of what has already been done, and considering the extent of activity now to be noticed, it comes as a pleasant duty to report something of the progress which is being made, progress, in fact, which assures that internal combustion types of motors are now claiming a fair share of the attention of the most advanced engineers who make a specialty of power transmission, considering carefully the thermal efficiency of the power plant proper.

Gasoline-Electric Generator Sets—Perhaps the most notable advance, which will count in the long run, is in connection with the relatively new attempts, on the part of manufacturers of electrical machinery, to build gasoline-electric generator sets, they being in the several sizes, ranging from a generator used to furnish power for a searchlight to the largest sizes, as required for lighting and power, in plants of pretense. Among the particular advances which were made in this field the generator sets now being offered by the General Electric Company, Schenectady, N. Y., are worthy of particular notice. These sets are made in several sizes, one of which having an output of 25 kilowatts, with an overload capacity of 25 per cent.

Compactness is a striking feature in these sets, and in plants where space is valuable, this phase of the situation becomes of more than a little moment. The labor problem is much simplified; it takes but a few moments per day for a man of just a little skill to keep this class of equipment in working order.

Charging Storage Batteries Considered—In these days, when electric vehicles are becoming more numerous than flies, as it were, the question of charging stations, at well regulated points all over the land, is being taken up and struggled with. The method of driving the charging dynamos has to be reduced to finality in the long run, and there is probably no better way from any point of view than to employ just such a set as is here referred to. A licensed engineer will not have to be placed in charge of the plant; space required is much restricted; efficiency is favorable, and the regulation is all that this class of work requires.

A 25-kilowatt generator set will easily handle 12 batteries at one time, and charging 24 hours per day, which is the most



Fig. 32 How square holes are broached, in a special press, at the plant of the National, at Indianapolis

economical way to do this class of work, makes it possible to charge fully 36 vehicle batteries at one time, even if each battery must be on charge for eight consecutive hours, which is not usually the case. Just how many batteries would have to be fully charged each day is difficult to state, owing to the influence of locality, character of service, and other details. In private service, as with cars owned by individuals, a 25-kilowatt generator set would be ample for fully 100 electrics. In cab



Fig. 33 Spiral half-time gears, made noiseless in operation by the method, as shown, at the National



Fig. 34—Portable pulley block crane, made by Cammeron Engineering Company, used in shops for handling motors, etc.

present, in any event. The skill demanded would not be beyond that of a man of fair intelligence, as a watchman, if he is worth relying upon at all.

GENERAL ELECTRIC PORTABLE DRILLS

Besides the types of direct-current portable drills that have long served in shops, especially in the department in which chassis frame and assembling work is done, there is now to be had, when the conditions require, types of alternating-current portable drills, which are efficient and capable. In some plants, owing to taking current from the central power companies, direct current is not available, and while electric motors may be run with good facility, and lighting may be accom-

plished, using alternating current, even so, in the past, the question of portable drilling was not in such good shape, and, in view of recent advances made in this field, it is pleasurable to note that this phase of the industrial problem is now well in hand.

plished, using alternating current, even so, in the past, the question of portable drilling was not in such good shape, and, in view of recent advances made in this field, it is pleasurable to note that this phase of the industrial problem is now well in hand.

Electrical Energy Required in Drilling—Considering machine steel, which is about the hardness of chassis frames and like work, the electrical current required is about as follows:

CONSIDERING THE SEVERAL SIZES OF DRILLS

Size of Drill	Time Required	Watts Taken	Current In Amperes
1-8"	30 sec.	110	1.3
1-4"	28 sec.	150	1.7
3-8"	95 sec.	200	2.15

Motors are regularly wound for a 60-cycle circuit and are capable of delivering something over 1.5 of a horsepower. The line current and input in watts are nearly parallel, and the power factor increases to slightly better than 90 per cent, at a little over half load. It is about half load that the motor must work in the average undertaking, and, under such conditions, the motor has an ample reserve of ability, heating is well in hand, and the power factor is at a favorable point.

Electro-dynamometers Much Used—In testing motors, in the respective shops, electro-dynamometers are now almost standard, they being, in principle, as shown in Fig. 35, in which A is the armature of the electric machine, B is the separately excited field winding over the pole-piece, of which there may be any even number (four, six, or eight being common), C is the field, and serves also for the frame. D represents one of the pedestals of the cradle, there being one at each end with bearings for the armature spindle, E represents counter weights, F is the arm, G is the platform of the scales, H is the beam of the scales, I is the field rheostat by means of which the strength of the field is altered to suit the requirement, and J is the rheostat, or other suitable means, by which the energy of the dynamo is disposed of. A bank of lamps, or water rheostat, usually takes the place of J. The armature must be wound, and of a size, to deliver about 600 watts per horsepower of the motor to be tested, but the voltage may be any desired value within practical limits. The figure is merely diagrammatic, and, in practice, there are several compact forms of electric-dynamometers to be had, and at reasonable prices, considering the value of the method. At the Rambler plant, a somewhat different method is in vogue, which was described in THE AUTOMOBILE, issue of December 23, 1909.

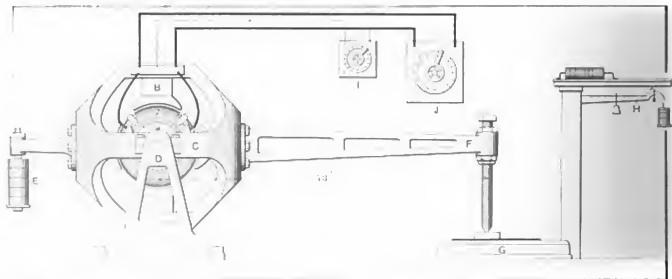


Fig. 35—Diagrammatic representation of an electro-dynamometer, as used for testing automobile motors, of which there are diverse modifications

Advanced Mechanical Features That Prebail

By Chas. F. Fay

TAKEN at random, some actual working drawings from which the automobiles as they are to be displayed at the Grand Central Palace were made, these drawings having been placed at the disposal of the author for publication, it will be possible to make a definite showing, much more so, in fact, than in any other way, particularly since the very cars on exhibition were examined during process of manufacture by the author, and at some length. Unfortunately, it will be impossible to reproduce more than a fraction of them, nor is it true that those reproduced make for more than representation of the situation in general, which it is the purpose here to reflect.

Safety Has a Large Share in Present Practice—It will be the purpose here to reflect, by illustrations and otherwise, the extent to which safety is uppermost in the minds of designers, and it is just this safety that accounts for the diminished list of accidents which statistics indicate. While the number of automobiles actually in commission have increased this last year to an enormous extent, the list of accidents has gone up but slightly considering the increase in the number of automobiles running.

Better brakes, superior clutches, advances in materials and a closer relation of the designer to the product account for improvement in this direction, and, considering the advances made, legislation of the rabid sort will soon be out of place. In many ways racing has played an important part, this method of testing out cars having the faculty of locating the little as well as the prominent weaknesses in automobiles.

While it is true that cars are this year more than ever the product of parts establishments, it is equally true that parts makers are more inclined to have their own way when reference is had to quality. It is now the settled policy of parts makers to grow a reputation which will serve as an asset in future, and they recognize the utter impossibility of doing so if they merely follow specifications, provided they reach the conclusion that the specifications are for inferior products.

Facings Used in Clutch Work—This year, in view of improvements in materials for facing clutches, there has been a distinct movement in the direction of dry-disc clutches, using but a limited number of discs and either cork inserts or asbestos fabric in the facing. Of the cork insert types nothing more will be said at this time, but of the asbestos fabric it may be well to refer to it in somewhat definite terms, giving results of a test or two, which will show that the claim for lasting qualities under heat and pressure is well founded.

Fig. 1 is of some of this fabric, which was pulled in a testing machine at the large plant of the

Pierce-Arrow Motor Car Company, with results as follows:

Thickness in inches.	Width in inches.	Ultimate Strength in pounds.	Thickness in inches.	Width in inches.	Ultimate Strength in pounds.
1.32	1 1/4	900	1.32	2	1,280
7.32	1 1/4	960	7.32	3	1,360
7.32	1 1/4	840	7.32	2	1,290
7.32	1 1/4	990	7.32	3	1,480
Approximate average ultimate strength, 2,743 pounds per square inch.			Approximate average ultimate strength, 2,876 pounds per square inch.		

Fig. 2 is of the same material after it was "fired" to determine its heat-resisting qualities, which proved to be satisfactory up to 1,110 degrees Fahrenheit; the material was still strong.

Fabric, taking advantage of the heat qualities of asbestos, is rendered strong by having the asbestos interwoven with copper or other suitable wire mesh, and it has been determined that the coefficient of friction of this material is not far from 0.25, which is considerably better than that of any of the higher grades of leather used in this class of work.

In some cases, to afford immunity from the ills of excesses of lubricating oil, cork inserts are used in conjunction with asbestos fabric, and when the design is happy the results are of a permanent character. Leather alone in cone clutches, if it is properly backed up by means of springs, seems to be entirely feasible, and many of the cars adhere to this plan. As it stands, then, for this year, clutch facings are quite well divided between:

- (A) Leather, in cone clutch work.
- (B) "Cork Inserts" alone, and with leather or asbestos fabric.
- (C) Asbestos fabric.
- (D) Steel on steel, lubricated or dry.
- (E) Steel on bronze, to some extent.
- (F) Steel on cast gray iron.

Clutch spiders are largely of aluminum, but the metal used is on a better footing than formerly, it being the settled policy to avoid the use of "scrap" in the process and demand ingots of far greater purity than formerly. The shapes of the spiders, as the illustrations herein given will show, are for strength, in the absence of great weight, and in sliding gears the effect of inertia is not so much to be noticed as on former occasions, when the weight of the spider was far greater than now.

Refinements in Clutches Noted—Tried methods seem to be in favor, and few indeed are the absolutely new clutches to be seen. It is very likely that the clutch, Fig. 3, just brought out by the Elkhart Motor Car Company and applied to "Sterling" automobiles, is the latest idea, in which driving is done through the shell A. in conjunction with its mate B, and in operation the wedge shaped member C,



Fig. 1—Physical test of Raybestos, proving tensile strength

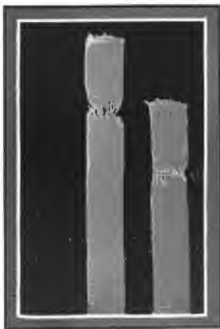


Fig. 2—Heat test of Raybestos, indicating heat-resisting qualities

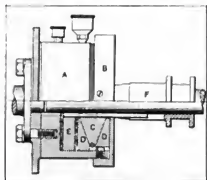


Fig. 3—New form of clutch, which is reported to perform with great precision

which embraces 90 degrees of arc, is moved toward the periphery of the adjacent disc by travel of the tapered sleeve F, thereby expanding the discs E, binding it between the base of the clutch and the member D. Red fiber is used as the friction material, this being a detail which may be altered to suit the individual.

Multiple Disc Clutches Being Improved—The best indication, perhaps, of improvements being made in multiple disc clutches is that as presented in Fig. 4, which is a driving member in Premier practice, the disc being of sawblade steel, properly heat treated and so contrived that the lubricant, if such is used, will be scraped away from between the discs at a rapid rate and the discs will spring apart when the tension of the spring is relieved. In actual practice in almost every instance oil, for purposes of lubrication, is not used, and the Premier Motor Manufacturing Company, Indianapolis, Ind., is authority for the statement that lubricating is not particularly desired; the clutch works dry usually for a longer time without attention of any sort. Fig. 5 is of a driven disc in Premier practice, in which it will be observed that the driving faces are liberal; this disc is also of steel, so that the drive is steel on steel, preferably not lubricated.

Clutch and Transmission Combined—Multiple disc clutches lend facility to the process when it is desired to place the clutch within the gearcase, as is done in the Inter-State Model 40, as shown in Fig. 6, and since the whole case is substantially cylindrical, strength is assured. The discs are lubricated in a very simple fashion, assurance being present of no lack of oil, since it is held in the case in excess. The service rendered by this system is sufficiently conspicuous to warrant one in predicting that it is one of the types that will survive for all time.

Brush Runabout Has Compact Clutch—The idea worked out in the Brush Runabout is to be commended, for this clutch, while it is of the multiple disc type and within the transmission case, is really a set of discs clamped between a set of vise-like jaws when the clutch is "in." The excellent work this type of clutch is doing rather goes to show that it is quite capable enough for general exploitation, and it is one of the features which has made the Brush Runabout all that it has proven to be.

Jackson Multiple Disc Clutch Simple—Referring to Fig. 7 it will be observed that the clutch in the Jackson, made by the Jackson Automobile Company, of Jackson, Mich., has three

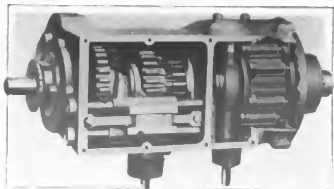


Fig. 6—Inter-State Model 40, showing the multiple disc clutch and transmission case

plates, they being of large diameter, actuated by a toggle motion in which pressure to the maximum is exerted at will by the operator, and lost motion, if it is generated in time, due to wear, is readily taken up by the means provided. In this clutch the plates are separated by the springs B, and the discs are prevented from rotating by the torque bolts A A A. For taking up lost motion all that is necessary is to undo the cap screw D, screw up on the shell enough for the purpose, and tighten up the cap screw again to lock the system in place. The toggle system C will require no discussion, it being exactly the same as has worked for years on the best types of locomotives in connection with the very powerful brakes demanded in express service.

National Cone Clutch of Great Simplicity—Fig. 8 is a section of the cone clutch with a leather facing, L1, and flat springs are placed under the leather around the periphery for the purpose of pressing the leather into proper engagement. The clutch is flanged, F1, and a long bearing, B1, serves to maintain concentric relations. The square spring S1 presses the clutch into engagement, and adjustment is secured by pressing the thrust block of the ball type up against the other end of the spring. Thrust is equalized by means of the ball thrust-block T1, and the universal joint back of the clutch J1 occupies a dual capacity, in that it compensates for flexure and takes up endwise motion.

Cork Inserts Found Beneficial—In many cases, especially in cone clutches, but not limited to them, cork inserts are used in the manner as shown in Fig. 9, which is a type of cone clutch as made by the General Manufacturing Company for several of the well-known makers of automobiles. The clutch in a general way is of the conventional sort, the only difference being that the periphery, as well as being provided with the leather facing, has cork inserts, as patented by the National Brake & Clutch Company, of Boston, Mass., spaced in sockets around the periphery. The cork affords a better coefficient of friction, works in oil as well as dry, lasts for a long time, as is proven in Premier brakes, and prevents the leather from burning out.

Marmon Idea Has Special Virtue—That there are divers ways of delivering satisfaction is shown by Fig. 10 of the Marmon, which is a leather-faced cone clutch, but, unlike other forms of cone clutches, the leather is pressed into engagement by means of spiral springs, which are placed in sockets around the periphery, and by means of a mushroom which engages above and interprets the spring pressure, the leather is maintained in good relation with the friction surfaces at all times. This type of clutch has proven of the greatest value, and is a fine illustration

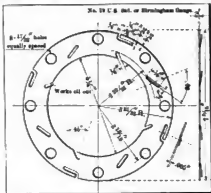


Fig. 4—Premier form of disc, designed to work well with or without lubrication

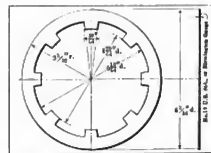


Fig. 5—Premier disc, mate of that shown in Fig. 4, designed to afford well-regulated surface

in Premier brakes, and prevents the leather from burning out. **Marmon Idea Has Special Virtue**—That there are divers ways of delivering satisfaction is shown by Fig. 10 of the Marmon, which is a leather-faced cone clutch, but, unlike other forms of cone clutches, the leather is pressed into engagement by means of spiral springs, which are placed in sockets around the periphery, and by means of a mushroom which engages above and interprets the spring pressure, the leather is maintained in good relation with the friction surfaces at all times. This type of clutch has proven of the greatest value, and is a fine illustration

tion of the extent to which engineers may follow their own bent if only they confine themselves to good work, maintaining friendly relation with the laws which control.

Regal 30 Represents Correct Assembly—In the Regal 30, as offered in Fig. 11, the cone clutch is pressed into engagement against a truncated cone of conventional angle, and the leather face is pressed into intimate relation by flat springs. The female member of the clutch is integral with the flywheel, and a universal joint is placed just back of the clutch sleeve, with a bearing intervening between it and the universal joint which serves as the termination of the torsion tube, which is concentric with the propeller shaft. The bearing, which is a Hyatt, is made of special nickel steel, and the work which the torsion tube lends at this junction is taken care of, so that it is not transmitted to the clutching members.

Connecting Rods Are of Special Steel—I-section drop forgings of a special grade of steel is used for connecting rods, it being the idea to limit the weight of the reciprocating parts to the utmost, and Fig. 12, of a Premier, is a good example of present practice. In this work, owing to the kinetic requirement, the material must be with well regulated carbon and metalloids; when the forgings are made they are also annealed, and a certain rigidity is catered to in the process. This connecting rod is for the

40-horsepower motor, and since all dimensions are given it will not be necessary to prolong discussion.

Still another connecting rod is that of the Moon, as presented in Fig. 13, for use in the Model 30, in which it will be observed that the metal is nicely distributed. The drop forging is of a selected grade of steel, annealed and otherwise rendered fit.

Cylinders Show Much Improvement—Fig. 14, of a Premier, is given complete, to indicate

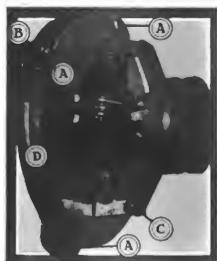


Fig. 7—Jackson plate clutch, engaged through a toggle motion, with soft but positive action and easy adjustment

the extent to which drawings have to be made in order to assure good and uniform pattern, as well as in machining. In this example there is evidence of certain refinement in that the walls are of great uniformity, the cylinders being cast in pairs, and at A in the section it will be observed that the oilway is drilled in two diagonal directions, in order that the oil will reach the piston pin when the piston is at the bottom dwell point, and in order to be able to accomplish this, considering twins, it is necessary to drill in the manner as shown. This is a fine example of care in design and construction as it obtains in the better cars of the year.

Referring to Fig. 15, of a Moon Model 30, which is the new Moon example, it will be observed that it represents a T-type of cylinder of extremely good design, and is a little more noteworthy in this case, due to the former practice of the Moon, which was to build with valves in the head. It is the claim of the Moon Motor Car Company that for the smaller car, as here represented, there is a little, by way of flexibility, to be taken advantage of in this designing.

Fig. 16, which is a Rambler, differs materially from some of the other designs, it being of the individual cylinder genera, with well-regulated thicknesses of walls, special material as put out in

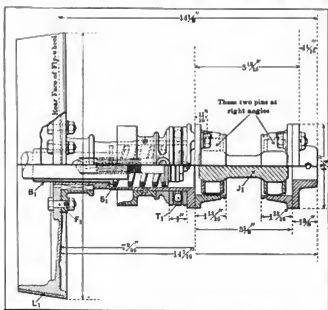


Fig. 8—National cone type of clutch with leather facing and flat springs to press leather out when square spring is free

the Rambler foundry, and so shaped as respects the frame-swept surfaces that cooling is efficient and easily accomplished.

In the smaller motors, as used in many cars of the year, cylinders are cast "en bloc," considering four-cylinder motors, and insofar as practice has shown they are very efficient indeed, rather going to indicate that practice in the foundry is up to a high standard.

Crankshafts Have Plain Bearings Mostly—Ball-bearing crankshafts, in spite of their good qualities, have made but little headway, although abroad there is some evidence of a revival of this excellent form. For the cars as they are to be seen at the Palace the best practice may be reflected by presenting a few of them, among which the Premier as presented in Fig. 17 will be mentioned, and, as will be observed, the flywheel is flanged on, bearings are liberal, and the proportions of the throws are in good keeping with the best requirements.

The National, as used in the motor of the Model 40, has all dimensions, given in Fig. 18, in which there is evidence of reserve strength, and the fine Italian hand of the designer left indelible finger prints. The throws are designed for strength, and considering the power of this motor at higher speeds, the section of the main bearings is made ample for the purpose; this motor speeds up to nearly two thousand revolutions per minute within the "stability" range of performance, and the crankshaft is balanced on this account.

In the little Brush runabout, while the car is sold at a very low price it has been possible to employ a crankshaft of splendid design, as shown in Fig. 19, and the material, which is a selected grade of crankshaft steel, is quite up to the standard set for the higher priced cars. This crankshaft is provided with means for attaching balancing arms,

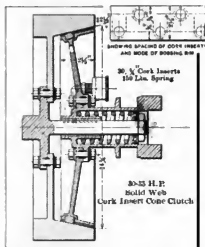


Fig. 9—"Cork Insert" clutch, of the cone type, made by General Manufacturing Company for many car makers

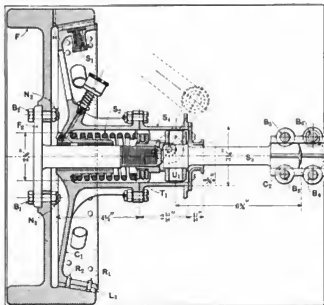


Fig. 10—Marmon clutch with leather facing and spiral springs placed to press leather into good engagement.

which are used in conjunction with a secondary balancing member consisting of a weighted gear, meshing with a pinion on the crankshaft, much as described in *THE AUTOMOBILE*, issue of October 14, 1909.

Transmission Gears Spell Finality—Selective types of transmission gears are used to the greatest possible extent, it being the case that the planetary types are limited to a very few of the smaller cars, barring one or two special examples. In the sliding gear systems, while there are some with four forward speeds and reverse, even so, three forward speeds prevail in the majority of cases. In one instance, the Hupmobile, a two (forward) speed sliding gear is used, the reverse being included, of course.

Fig. 20, of a Premier, will serve as a good example, it being for three speeds, selective, with reverse, and annular type of ball bearings are used throughout. The shafts and the gears,

are made of a superior grade of alloy steel, are also relatively short, of liberal cross-section, hence free from any tendency to deflect under the load. The annular ball bearings are properly placed, the inner raceway being locked on, besides being a "sucking fit." The racks by means of which the sliding gears are shifted are of good diameter, reciprocate in long bearings, and the fork-arms are shaped for the work to be imposed upon them.

Unit Type of Transmission Interesting—In the American Simplex, made at Mishewaka, Ind., the unit type of axle and transmission is elaborately worked out with the lay shaft on the side, and the section shown in Fig. 21 is in the vertical plane, showing the location of the reverse pinion, laying in a depression in the bottom of the case in the same plane as the main shaft. This pinion rolls on an annular ball bearing, and the spindle is prevented from rotating by a through bolt at one end. Fig. 22 is the other view of this system, in which the relation of the lay shaft is clearly depicted and annular type ball bearings show at all points. This view also presents the jackshaft, one wheel, and shows the method of joining the wheel to the shaft, using taper fits and a hubnut of competence. The bevel pinion rotates on a pair of annular type ball bearings, thus taking the load in such a way as to prevent bending of the spindle. The differential gears are of the bevel type, and the housing rolls on ball bearings too. The gear is of the three speed and reverse, selective type, and while the whole looks a little heavy, yet even so, experience has shown that the weight is well distributed, the road performance being thoroughly good in every way. The materials used in the gears, shafts and other parts are alloy steel, excepting the case, which is of aluminum.

Marmon Presents Evidences of Refinement—As shown in Fig. 23, the unit system prevails. The transmission gear is of the selective type, with three forward speeds and reverse, and direct drive on high speed is brought about by sliding the internal gear G1 into mesh with the teeth of the pinion G2. Hill-climbing gear is let in by meshing the external teeth of gear G1 with the teeth of G3, when the gear ratio is unity, due to the fact that both gears have the same number of teeth; this leaves the bevel drive as the only means of gear reduction in intermediate speed, which reduction is that due to 53 teeth in the bevel gear and 16 teeth on the mating pinion, and $53/16 = 3.31$. Low gear, used for accelerating, is let in by meshing G4 with G5, and the reverse requires that G6 and G7 engage with G4.

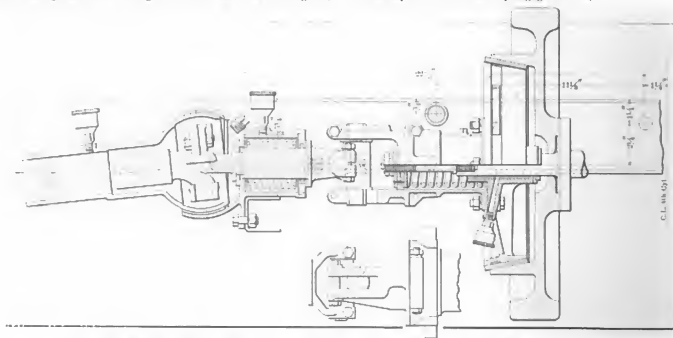


Fig. 11—Legal clutch, universal joints, torsion tube termination, and Hyatt roller bearing to resist load

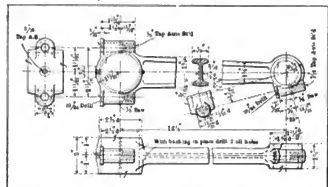


Fig. 12—Premier connecting rod, die forged, of steel, and designed for strength and low secondary moments

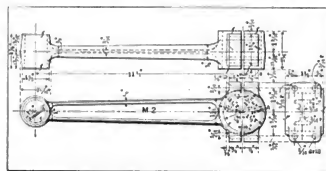


Fig. 13—Moon connecting rod, die forged, of steel, rendered light, yet strong, to eliminate inertia

The bevel drive, involving B1 and B2, with the latter flanged to the differential housing by bolts B3, B4, etc., is held in rigid relation by the large diameter shaft S1 and the large annular ball bearing B3, which is a sucking fit, and presses against the shoulder S2, is held on by pressure of the bevel pinion B1, and the end of the shaft is threaded, T1, so that the nut N1 is screwed up against the washer W1, locking the whole system in place. The pinion is prevented from turning by a key, K1, and the nut N1 is locked on by means of a wire in a groove, L1.

The lay shaft S2 is of large diameter, relatively short, hence rigid in the extreme. The gears are keyed on at K2 and K3, are of hardened special steel and of a shape to resist deformation in the process. The prime shaft S3 is a square, and the sliding gears are, like the fixed gears, hardened and of a shape to stay put. At the telescoping joint the gear G2 serves as a sleeve, and annular ball bearings B4 and B5 carry the load. Dirt is excluded by means of the housing H1, which engages the torsion tube T2, which is in concentric relation with the propeller shaft P1, and encloses it completely.

Novelty and the Rear Axle Are Companions—In Fig. 24 the jack shaft S1 is flanged at its end F1, and a supplementary flange, F2, bolted to the flange of the jack shaft, is faced off and fits against a face on the hub member, H1, of the rear wheel on each side of the car. The hub H1 is bored out to take a single annular ball bearing, B1, and this bearing, while it does all the work, is dead on the center line of the wheel, so that it is in a position to assume all the responsibility. The ball bearing is a sucking fit on the reduced diameter of the bronze sleeve S2, and this sleeve fits over the drawn steel tube T1, which is concentric with the jack shaft.

The ball bearing is held securely in place in the most approved manner by means of a locked threaded shell, S3, and the jack shaft, which is of the semi-floating type, is prevented from floating off by the interference of the petticoat P1 of the hub member H1, acting in conjunction with the flanges F1 and F2, they, in turn, being secured in place by means of

the hub flange bolts B1, B2, etc., and the rivets R1, R2, etc. The hub cap C1 fits over the flange F2, and is held in place by cap nuts N1, N2, N3, etc., and the appearance of the wheel is somewhat unusual, due to the elimination of the conventional hub.

The brake drum D1 is fastened to the spokes S3, S4, etc., and the drum, while it is of unusual diameter, is also very wide, there being room, side by side, for the two sets of brake shoes S5 and S6. The shoes are faced with asbestos fabric, F3 and F4, which is heatproof and possesses a high coefficient of friction. The shoes are prevented from dragging by the springs S7 and S8, and when it is desired to apply the brakes it requires but a torsional effort on the brakeshaft S9 or the concentric tube T2 for the other set of brakes; this torsion, applied to either set

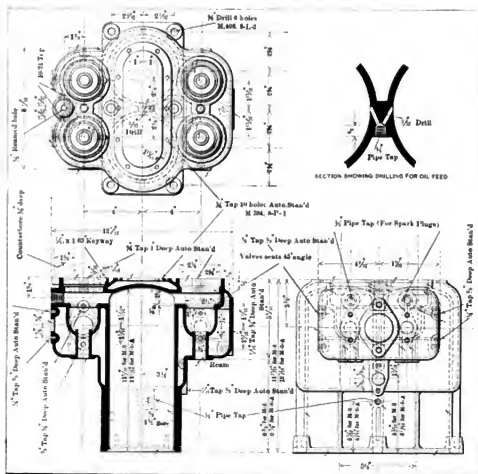


Fig. 14—Premier cylinder design, showing completeness of undertaking, uniform walls and efficiency of scheme

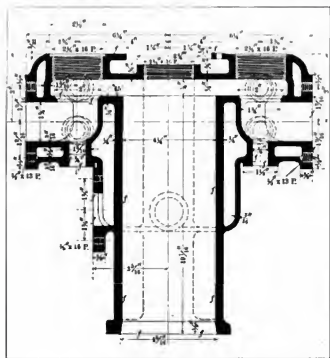


Fig. 16—T-type of Moon cylinder, which is the latest idea in Moon practice, depicting excellence in design

of members, will actuate the respective cams C2 or C3, expanding the bands and applying the necessary pressure to arrest the motion of the car. The brakes are powerful, and, all told, the area of contact of brake shoes is close to 352 square inches, and while the area of surface is not the main factor when effectiveness of brakes is to be determined, it is true, nevertheless, that the life of the brakes will depend upon this area of shoe contact.

Compactness is a Desirable Feature—The Regal, Fig. 25, is a type of unit transmission which for compactness and utility represents an advance, and the nickel-steel Hyatt roller bearings have the virtue of serving well the intended purpose, besides accentuating the compactness noted. This transmission is of the three-speed selective, with reverse, and, being carried by the rear axle below the spring suspension, takes up but little room, which counts as an advantage, as was shown by the Regal "Plugger" on its trip across the continent.

Live Rear Axles Much Improved—Taking the Premier as a type, the tube is of substantial design, but light, flaring out to a spherical bulb at the middle, as in Fig. 26. Timken roller bearings, R1, are placed on each side of the differential housing D1,

which supports the differential member in the tube just at the enlargement, and the differential shafts are provided with liberal bearings, B1, at a point just before the square S1 engages the differential pinions. The most interesting point, perhaps, is in the detail of the propeller shaft just as it enters the housing, showing bearings B2 and B3, of the annular type, taking the load imposed by the bevel pinion and the bearing B2, supported by the dished member D2, which is made of steel.

Out at the wheel, Fig. 26, the brake drum D3, which is of large diameter with a brake-shoe area (total) of over five hundred square inches, which drum supplants the hub flange, being bolted directly to the wood, this being possible since the drum is integral with the hub. The driving jaws J1 are inside and the ball bearing B4 is just where it is in a position to take the load due to the jaw connection. The hub H1 of the wheel is fitted at A1 and A2, and a nut, N1, inside of the hub cap, keeps the wheel on the jackshaft. This axle, in view of the good service it has rendered, may be looked upon as representing permanence and one of the earmarks of automobile engineering.

Automobile Wheels Are Stout and True—As an illustration of present practice in wheelmaking, Fig. 27, of an American Simplex, is here offered, it being the case that the woodwork is especially well fashioned and the hub, which is of a good grade of steel, has excellent flanges for the purpose. In all respects the wheel is so clearly shown that further space will not be taken in discussing the details.

Lubrication Makes for Long Life—Noiselessness, which is the cry of the autoist, and which causes more annoyance this year to builders of cars than any other one point, will not for long re-

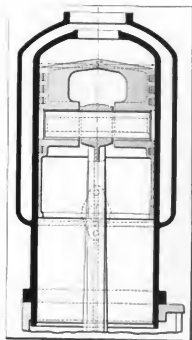


Fig. 18—Rambler cylinder, in section, cast individual, of great uniformity, and conforming to best requirements

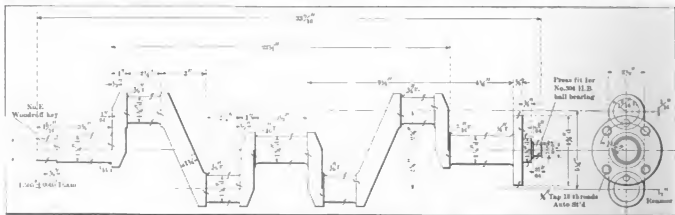


Fig. 17—Premier crankshaft, with flange for flywheel, using fine material and shaped for long life in rigorous service

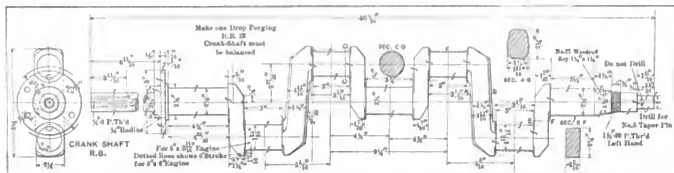


Fig. 18—National crankshaft, made of best crankshaft steel, with stout throws and perfectly balanced for high speed

main a fair claim for a car, no matter how well it is made, unless lubrication is absolutely effective. Grease cups serve a very important purpose in the cars of the day, they being placed at every point of vantage around the chassis where profuse lubrication by other means cannot be induced.

Fig. 28, representing an end bearing of a Rambler motor, shows how carefully details are cared for when reference is had to lubrication in which the oil is returned to the crankcase through the way W1 after it has served its purpose, which is to lubricate the bearing and keep the silt of the road out.

Fig. 29, of a Moon Model 45, is representative of the best practice, in which the oil is fed through oilways O1 in the crankshaft through spaces enclosed by plates B1, which rotate with the crankshaft, and the oil is thrown out to the right point by centrifugal force. The oil enters the spaces from the bearings, and the original feed is from a pump which brings the oil to the openings, one of which is shown at O2.

Regal Lubrication Is Positive—While the positive system of lubrication is used, it will be worth while to note that in this motor the oil level is maintained by means of an overflow system to a "sump" which shows in the bottom half of the crankcase, to the right. When the oil enters this space it is lifted by a gear pump of excess capacity, passes up through passageways in the case, and is shot out against the bearings to be lubricated, which bearings are suitably provided with channels for the purpose. The result is, the lubrication is profuse. Since it is important to know how much lubricating oil there may be in a system, the motor is provided with a tell-tale so located that it may be readily seen, and is actuated by means of a float in the oil well, but it is so arranged that the glass will not coat over and hide the readings. The float is of cork, and operates much the same as the float of a carbureter. This is fixed at the lower end of a vertical rod, upon the upper extremity of which is attached

the indicating disc. The latter thus moves up and down, with the float which marks the oil level, and registers the same on the gauge glass, the same being visible to the driver from the exterior.

How National Lubrication Is Coped With—By referring to Fig. 30, which is a section of the crankcase, longitudinal at A and cross-sectioned at B, the lubricating oil is held in a basin, B1, which in section looks as in B2. In the same sectional view the filter F1 is placed, and the arrows show that the oil flows in, it being cleaned at this point. The crankcase is scooped out, or, better yet, it is contrived with a false bottom, B3, with well-holes, W1 and W2, leading into a passageway, P1, connecting the two, and at the mid-position of this passageway a third well-hole, W3, is placed, the purpose being to equalize the flow of oil, preventing it from piling up when the car is negotiating a grade, and in this way the cylinders are prevented from becoming fouled.

Referring to the cross-section B, Fig. 30 again, the oil-pump P2 is located in the bottom part, is driven by the vertical shaft S1 and Oldham coupling, O1, prevents the shaft from being cramped and allows the gear-pump entire freedom, so that the members are free in the housing.

How the Lubricating Problem Is Generally Handled—In the Paterson Model 30, which is made at Flint, Mich., is a unit power plant, with four cylinders cast in pairs, lubrication is by constant level splash, and means are afforded for the profuse lubrication of all the bearings by means of suitable oilways. The transmission, which being integral with the motor, takes all excesses of oil that may get by. The oil is held in the bottom of the crankcase, and by means of a pump excesses of oil are disposed of; at the same time the right amount is positively maintained, due to the placing of suitable dams (ribbing) in the case. A cone clutch is used.

In Mitchell cars, made by the Mitchell Motor Car Company, Racine, Wis., the oiling problem is met by using a Lavigne lubri-

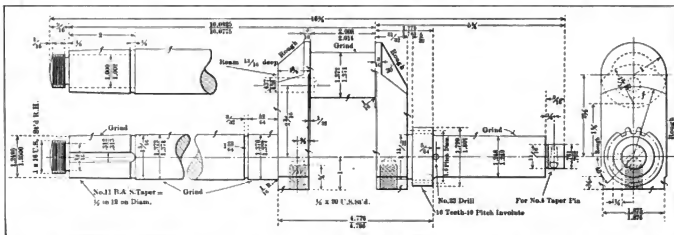


Fig. 19—Crankshaft as used in the Brush Runabout, for a single cylinder vertical motor, and balanced for high speed

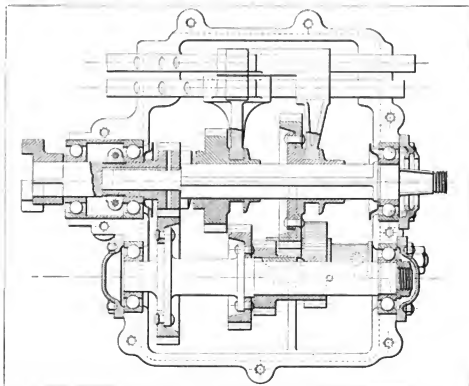


Fig. 20—Premier transmission gear, for three speeds and reverse, selective, and direct on high

cator, which, being positive, has the virtue of delivering the exact right amount of oil to the respective bearings with certainty. The oiler is located on the crankcase, at the front to the right, is belt-driven, and two of the six leads go to the cylinders, while the remaining leads connect with the end bearings of the crankshaft, clutch and crankcase. In the Mitchell there are diverse mechanical features that should be given space, but in view of their novelty it is necessary to consider a time when the whole car will be taken up for the purpose of exploiting its excellent qualities.

In the Reo car, referring to the 1909 four-cylinder model, the question of lubrication is cared for in a somewhat different way; the system is self-contained, and piping is entirely done away with. This is brought about by having the plunger pump which is used down in the crankcase, it being driven from the camshaft by means of an eccentric. Lubricating oil is pumped up from the reservoir in the base to the three main bearings of the crankshaft and to the faces of the spiral cams. The plunger pump has the virtue of lifting a definite amount of oil at each stroke, and the number of strokes increase with the speed of the motor, so that lubrication increases as the requirement.

In the Chadwick, made by the Chadwick Engineering Works, Pottstown, Pa., oiling is by splash, but the force-feed oiler is direct drive, hence chances of failure are eliminated. The oil is independently delivered to the respective bearings by separate pipes, and the oil level in the crankcase is definitely maintained. The pump delivers oil to 14 points, i. e., six cylinders, four main bearings, three compartments in the crankcase,

and one to the transmission gear case. In this make the condition of lubrication is definitely maintained at every point, and as a result the Chadwick is insured against undue wear, thus eliminating noise as a future prospect. In this make of cars the chains are booted, they being of the side-chain drive design, and by thus keeping out the mud accumulations which would otherwise attach to the chains they are maintained in good working order for several years.

In Stoddard-Dayton automobiles, as made by the Dayton Motor Car Company, Dayton, O., lubrication this year is attended to by utilizing a rotary pump rather than the plunger type of previous years. This is claimed to be a better plan, the idea being to copiously lubricate every bearing. Grease cups are also placed at all points, as on spring shackle bearings, and the springs for this year are 3-4 elliptic, rear, of a very well executed design, the front springs being 1-2 elliptic, which is desirable under conditions of constant loading. With Stoddard-Dayton cars a "lubricating chart" is delivered with each automobile, it being the idea to coach each owner in the art of attending to this important matter, the Stoddard-Dayton maker fully realizing the necessity of maintaining a profuse state of lubrication if noise and trouble are to be kept out; the very essential detail, however, is that oiling facilities are provided in the cars, thus putting it up to purchasers to do the rest.

Large Diameter Road Wheels Help Out—The American Traveler, made by the American Motor Car Company, Indianapolis, Ind., differs from many products, in that 40-inch road wheels are used and lubrication as a requirement is somewhat reduced on this account, insofar as road wheels are concerned. For the rest, a gear pump is employed, being connected in the engine case, with a sight feed on the dash. A container located in the crankcase holds 11-2 gallons of lubricating oil, and two extra gallons of lubricating oil are carried in a separate reservoir, thus assuring an adequate supply for touring, which is what the car of this subject is much used for. The liberal use of annular type ball bearings in this model, as well as in all cars of

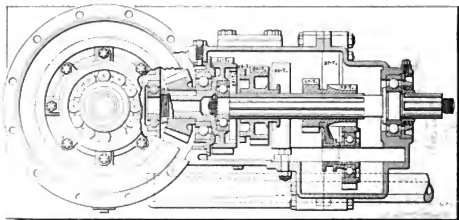


Fig. 21—American Simplex unit type of transmission, longitudinal section in the vertical plane

this company, reduces the lubricating problem to a low level, although, of course, a power plant of the proportions of that used in the Traveler requires more than the ordinary amount of lubricating equipment, which is the reason, perhaps, that the company has made such liberal provision. In this car the motor has a bore and stroke of 5.3-8 x 5 1-2 inches, respectively, and is rated at 60 horsepower, which, as ratings go, is very conservative to say the least. The transmission, which is a selective four-speed and reverse, as well as the differential, which is of the bevel type, run in oil. Power is on an increased basis, largely due to nice design features, and the ignition, which is a Bosch high-tension (dual) system, is so utilized as to afford the best results.

Success Accentuated by Bearings Used—Practice, from the point of view of bearings, excludes plain bearings from all but crankshafts, for the most part. While there is slight indication of the ability of annular types of ball bearings in crankshaft work, even so, considering service rendered by plain bearings in this zone, designers have been a little slow to depart from them.

Of the anti-friction bearings used, the main point to be made is that there is no hard-and-fast preference, it being the case that quality resides in the several types, and in selecting them it is more to the point to employ liberal sizes and having them made of good material, accurately, than to select some one generic type of bearing without bothering much about quality of material and workmanship.

The cars of the year, among the makers of the subject, are provided with:

- (A) Hess-Bright (D.F.W.) annular type ball bearings;
- (B) Bretz (F. & S.) annular type ball bearings;
- (C) New Departure dual annular type ball bearings;
- (D) R. B. F. annular type ball bearings;
- (E) Standard roller bearings;
- (F) Timken roller bearings;
- (G) Hyatt roller bearings;
- (H) Cup and cone bearings of various makes;
- (I) A wide variety of thrust bearings by the several producers.

Materials Used in Ball and Roller Bearings—In plain bearings, considering the better class of work, the anti-friction members are "die cast" more often than not, and copper-tin mixtures obtain to a vast extent. In the copper-tin mixture the proportion of tin is 90 per cent.

In the annular types of ball bearings, while there is a wide variation from the point of view of materials used, even so, it is the general practice to employ far better products than those of former times, which is a good reason why failures are scarcely

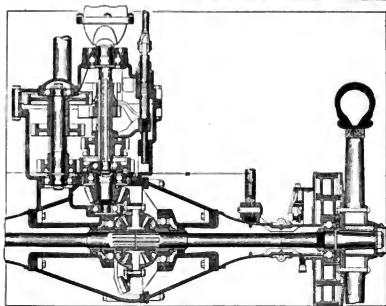


Fig. 22—American Simplex, showing unit transmission system, in section, cut through horizontal plane

ever to be noted. In some of the bearings the carbon is too points; in other examples, 90 points. Some of them are alloyed with chromium; more are not, but in all cases it is the aim to have the metalloids very low, and crucible steel obtains to a vast extent.

In roller bearings, especially those which are cemented, special grades of cementing steel are used, in which the carbon is probably under 16 points in the initial material, and the purity of the stock is looked after with the greatest care. In this class of work, as a result of the methods of heat treatment, the shell is quite as hard as that of the hardest balls (the carbon being the same or even higher), while the core is relatively soft and kinetic properties are coaxed into the material by this method.

CHASSIS WORK IN FULL KEEPING

While the chassis frame is utilized as a platform for the machinery equipment, and serves as well for a place on which to rest the body, it is not looked upon as sufficiently stable to offer adequate rigidity, all things considered, and flexibility is imparted to the machinery units—so much, in fact, that the chassis frame is not expected to do more than serve as a bridge, as it were, in which class of work flexibility is courted.

The scheme of design, then, for automobiles, taking them as a whole, is on a basis of flexibility, which characteristic is embodied in the frame to some extent, and in the assembling of the machinery unity to the maximum possible degree. In chassis frame work there are three prime methods in vogue:

(A) Narrowed frames, without a kickup;

(B) Frames with a narrowing at the front and a kickup behind;

(C) Straight frames.

Channel sections obtain almost to the exclusion of all other shapes, and, considering the lateral tieup at several points from front to rear, the strength of the section is made a maximum in the vertical plane and minimum in the transverse plane.

In many of the cars of the day the rear suspension is 3-4 elliptic, and the frame is stopped off just back of the center line of the rear axle, unless in the examples in which the body is ex-

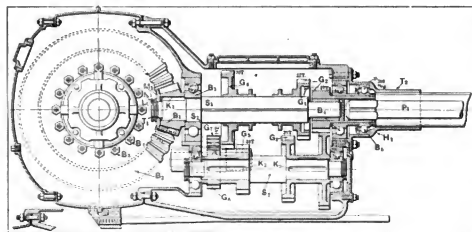


Fig. 23—Marmont unit system of transmission, with lay shaft below, and appearance of excellence of design, using fine materials

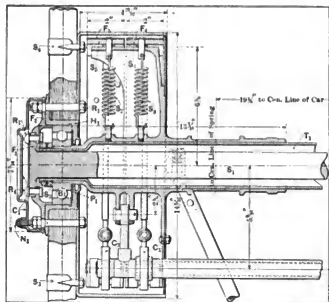


Fig. 24—Marmon live rear axle, showing brakedrum of good diameter, and wide enough to accommodate two sets of shoes

tended back a greater distance, when, of course, the frame is extended back also. The design, as found in National cars, is an excellent illustration of a kickup at the rear and 3-4 elliptic scroll springs, they being wide, with a liberal allowance of metal in the plates, without having them too thick, the result being that the cars ride well, part of which performance is, of course, due to a good length of wheelbase, and, perhaps, to the low center of gravity which is natural to frames of this character.

In the American cars with underslung frame the center of gravity is very low indeed, and having the frame below is another way of realizing all the good that comes from a kickup. The American frames are narrowed at the front to afford a liberal turning angle of the front wheels, considering the use of 40-inch tires on the road wheels.

In the Stoddard-Dayton cars the 3-4 elliptic rear springs fasten

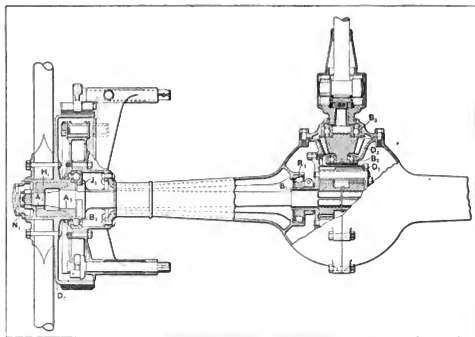


Fig. 26—Premier live rear axle, presenting tube of great strength and lightness, with brake drums of liberal area, and bearings of unusual ability throughout

on to the rear termination of the chassis frame in such a way that the springs fall outside of the outer line of the frame and the work comes on a liberally sectioned rear lateral. Taking it on the whole, it is a neat piece of work, and one of the points well worth examining in the cars of this make.

The Premier, from the chassis frame point of view, is a fine example of stability, considering the manner of caring for lateral work, in that the web of the channel section is extended down just at the point of narrowing, and strength is added in the process to a marked extent. The shape of the Premier, taking it as a whole, is for strength, it evidently being the idea of the designer to have the frame stand up under collision conditions, and the extension at the front, for illustration, is much as a strut. In the Moon and some other frames, in order to add strength just at the point of narrowing, the flange is widened and cross members come at the place of greatest advantage.

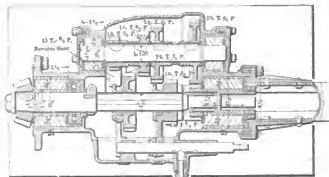


Fig. 25—Regal transmission gear, showing compactness, and Hyatt nickel steel roller bearings

The material used is also on a basis of rigidity, and in the fashioning an attempt is made to preserve the metal to the greatest extent, this being done by making the turns with the greatest possible radius.

In the Cole "thirty," which is a newcomer made at Indianapolis, the chassis frame is neat, strong, and has the virtue of being along tried-out lines. In this car, also, the shaft for the steering gear comes out above the frame, and a secure fastening

out of harm's way is the product.

The running boards are fastened to the frame by means of pressed steel hangers, and, taking the frame as a whole, it is an excellent piece of work, matching up with the whole car.

Materials Used in Chassis—Nickel steel is the mainstay—it being of a special grade, suitable for work of this character, taking into account the bending process and the effect of abuse of this character on the material. On account of the toughness and strength of this steel the work is done hot, and when the frames (sidebars) are formed they are then annealed. In some instances, in order to induce quality to the maximum, the sidebars are oil-quenched and then annealed.

As a second grade of side-frame stock, boiler plate is used, the same being acid open-hearth material low in carbon and fabricated to induce the requisite qualities. Next to boiler plate, which makes a superior frame, basic steel is employed, and when it is a specification product the

method of doing the work is carefully considered. The diameters of the tubes are regulated in view of the shape, and if brazing is done the parts are pinned as well. Purchasers of acumen this year are inclined to give this matter a little attention, and it is reasonable that they should.

Body Work Has Advanced a Pace—Torpedo types of body work look a little novel; they represent something by way of utility, keeping out the cold, reducing wind resistance, and are probably with us to stay, for a time at least. With the lengthened wheelbase, which is a characteristic of the year, there is more room for body innovations, and the torpedo type is the real innovation. The tendency is for more foot room in front, it being the practice now to allow about 26 inches from the panel of the front seat to the back line of the dash; last year this distance was about 24 inches, but in many cases it was less—23 inches perhaps.

While aluminum is being used to some extent in the higher priced body work, the fact remains that sheet steel and products using sheet steel as a foundation are being used to a great extent. The woodwork is on a substantial basis, and the framing is so ironed, as a rule, that body work may be regarded as on a most stable basis.

Upholstery, despite the use of some leather of a rather inferior grade, is as a rule on a fitting basis. Hand-buffed leather is much used, even in cars of quite low prices, and the stuffing in many of the examples is No. 1 hair. Machine methods of doing upholstery are now so well advanced that quality within allowable cost is a reasonable expectation. It is this advance in method, perhaps, that is at the bottom of the rather good quality, taking it as a whole, which is to be noticed.

Water Cooling by Different Methods—Of the cars with water-cooled motors, while most of them circulate the water by positive means, some employ the thermo-syphon system, notably Regal and Ford, and in the Regal, for illustration, the method of cooling is quite different from that in vogue in general when reference is had to thermo-syphon systems. In this system the water enters the radiator pocket about 2-3 up from the bottom. The water is then deflected up, or down, depending upon the offering resistance to the flow in either direction. All the water that passes up is cooled in the process, and it then descends, through separate tubes, and when it arrives at the bottom, where it mixes with the water that descends directly, it is substantially of the same temperature as the water which directly descends. In this system, as it is understood, steam, if any forms over the domes of the cylinders, is used to force the water up, and the steam is condensed before it arrives at the top of the radiator, thus preventing steam from spouting out of the top of the radiator, or through the overflow. The radiator maintains a very efficient temperature at all times, and the size of the same, despite the application of principle of the thermo-syphon, so called, is very well within the limits for other types of radiators. This type of radiator as referred to is made for

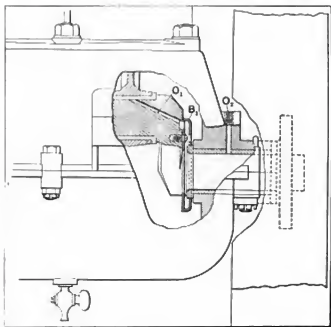


Fig. 29—Moon, presenting a detail in the method of lubricating the crankshaft, indicating ingenuity

the Regal by the McCord Manufacturing Company, of Detroit.

In the commercial section, the Grabowsky power wagon, as it will be shown, will also have a radiator in which the water enters at a point below the top, but in this radiator the space above the water level is filled with steam, and the temperature being higher at this level, the quantity of heat which will be disposed of, will be greater, so that the radiator has a higher inherent ability; this type of radiator does very fine work, and it may be regarded as a type which the future should see more of.

In water circulating, centrifugal pumps are very much to the fore, it being the case that they deliver the required volume of water, and last for a long time, there being no surfaces that are prone to wear; moreover, these pumps deliver water whether they are well fitting or not. Centrifugal pumps, in view of their noiselessness, are, as a rule preferred, and, in the examples of gear pumps to be seen, they are so made that noise is practically eliminated; they must, however, be well made and of good design, to come within the class designated as noiseless.

Air-Cooled Motors in Good Presence—It would seem as if the air-cooled examples are just about holding their own, there being no desertions of moment, and the newcomers are mostly among the high-wheeled rings. Principles, as they are apparently carried out, are about on a par with former practices, referring to examples at the Palace.

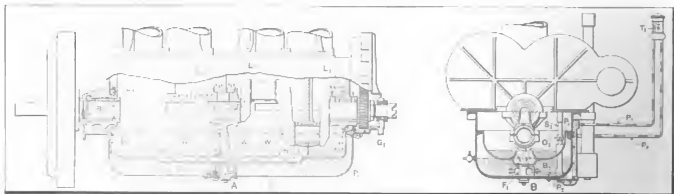


Fig. 30—National, showing a section of the motor and method of lubrication, with a gear pump in bottom of case

Contests of Value to the Automobile Industry

By R. C. Smith, Chairman, A. M. C. M. A.

ENDURANCE contests furnish valuable information to the motor car builder and guide posts to the purchasers in choosing between cars.

If we reflect and note how little was known of the automobile, even by the makers, less than ten years since, and consider the small number of cars then in use, one would naturally conclude that it would not be reasonable to suppose that the average buyer, and particularly one contemplating his first purchase, is well equipped with the knowledge to judge the value, actual and relative, of the various cars found on the market. The public have a right to know and demand the proof of the worth of a car, but the great question is, the basis for establishing the proof. The conscientious manufacturer undoubtedly tries out and proves the worth of an idea before incorporating it into the product, and if this is true with the several individual items entering into the construction of a motor car, why would it not be reasonable to subject the entire car to conditions which would try and prove out and determine the worth of the car as a whole.

Automobiles can no longer be classed as a luxury or a fad. The purchasers are seeking value, and are interested in the ability of a car to perform properly, and its dependability. Undoubtedly some cars are better than others. Some cars of a given class or price are better than other cars of the same class or price, but the value is not altogether indicated or determined by the appearance of the car. What is in it; what constitutes the vital parts; how every part works with the other—are the bases for determining the results to be obtained from the car as whole, and the public should feel interested and have a right to know the results which can be expected of a finished car.

One or more unsatisfactory features, coupled with few or many excellent features, would make a satisfactory car impossible. Undoubtedly a perplexing question to the buyer of a car, where so much is at stake, is how to know whether or not he is getting his money's worth, and a car such as he has a right to expect.

Looking at the situation broadly, the purchasing of a motor car is in line with the buying of any other article. The average buyer of a steam engine to be installed in a power plant is probably not as a rule well posted on the relative merits of the engines such as are offered to the market, and certainly not if a decision is supposed to depend upon his personal ability to judge the engine by its appearance and several mechanical features, as they appeal to him. In such cases a decision is not arrived at without an investigation of the way the various makes perform in service, and no doubt comparisons are drawn to determine the relative worth of the various makes under consideration.

This same information concerning a motor car can be obtained. All motor cars of standing have histories which reveal the strong and weak points and what the car can be depended upon to do. This information as it comes from individual owners is valuable, but conditions prevail in the motoring world which make possible even more accurate comparisons.

Follow the contests which have been run under rigid rules and strict supervision and the history of the various cars entered and the results carry information which can be relied upon. Not only have these contests become more rigid as cars have developed and we have made advances in the art, but added to the ordinary rules governing the road performance has been that of an inspection at the finish, showing in detail what it has cost the car to cover the course, or the effect the hardships have had upon it. Such information should be invaluable to the buyer. There is no given standard by which a motor car can be measured, but the comparative showing tells the comparative worth.

From year to year we have profited by our experience in contests in this country, and each year have made them a little more rigid than the year previous.

A still better guide would be furnished the buyer, and the information would be more accurate, were it possible to have all contests of a kind carried on under like rules, with a committee selected to govern the various contests, insuring like interpretation of the rules, and awards be made only after full consideration of all the entrants guided by the rules under which the contests was started and run. This would not only give the public the opportunity of judging the cars in each contest, but the various cars in the various contests. These results should be a telling criterion and of value, not only to the purchaser, but quite as much to the manufacturer who is earnestly endeavoring to produce the best car possible. They have the effect of demonstrating to each entrant if any competing car in the contest is better, and of showing to the world the best car.

Strenuous contests tell a story which should carry weight, as constantly keeping at it is what shows up the weaknesses.

Contests can be classified under three heads: Speed, hill-climb and reliability.

Speed contests are fascinating and instructive along certain lines. They may show the ability of the designer to produce a fast car, but this is sometimes done at the expense of durability. The history of the past shows that racing cars have frequently differed even in the fundamentals from the stock product of the same make. In designing, speed can be taken into account as the main object and the results may be at the expense of long life and reliability. It is not always the snappy and fast motor which goes farthest. In speed contests, cars are as a rule entered with a view of covering the course in the shortest time, irrespective of cost, either as relates to the whole, or damage in the way of wear and tear, the question of the car at the finish in such events being of secondary consideration, if considered at all.

By following any of the large events it will be noted the amount of work in instances which is done on a racing car to keep it going, and yet, if it crosses the tape first, it is heralded a winner, though other cars may have suffered less on account of the strain and hardship, and be capable of going much further than the winning car. A most appropriate example is furnished by one important race this season where a certain car finished first and was pronounced the winner when it was known that, due to certain parts going out of commission, the car finished on three cylinders.

Reliability is what counts in every-day service of motor cars, and most cars are capable of attaining a speed greater than the average driver can pilot a car with reasonable safety.

Hill climbs can be viewed in much the same way, since, as with a race, the conditions are usually abnormal and the temptation to build special for the particular test is usually more than the maker can resist.

Notwithstanding the fact that these two classes of events have their value, the third class, known as reliability contest, will no doubt generally be accepted as the most reliable character of events, where results as a criterion are desired, there being no object in building special were it permitted, provided the maker is trying to produce the best possible car regularly. These contests are characterized by touring conditions and tell a truth worth knowing.

There is probably no better way for one contemplating the purchase of a motor car to be assured a basis of judging cars than by looking up their records. The showing made in one of our large annual contests during the past year has astonished the

world, including those who participated in the event. The Glidden tour covered a distance of almost 2,700 miles and the schedule required an average of at least a mile every three minutes on the road from Detroit to Kansas City, by way of Minneapolis and Denver, irrespective of road or weather conditions. An observer was appointed by each entrant, these observers riding on other cars, and changing every day. This avoided a possibility of violating the rules without penalty, the contestants not being allowed to use any new material, to make any repairs, to adjust

so much as a bolt or screw, with the exception of brakes, oilers and ignition without penalty, and with ignition, no exchange, replacement or repair of parts were permissible. Notwithstanding these strenuous conditions several cars finished with perfect road scores at Kansas City.

It is a true saying that motor cars, like men, have a record and a history, which tell what they are and what they have done and furnishes a most reasonable basis for deciding what they can be depended upon to do.

ADVANTAGES OF INCREASING THE WHEEL SIZES

BY CHARLES E. DURYEA, TECHNICAL EXPERT, A. M. C. M. A.

THAT large wheels roll more easily than small ones everybody seems to know, but it has only been a few years since that same everybody seemed to think that no real automobile could be equipped with other than small wheels. To try the self-propelled vehicle with wheels of the size in common use on horse vehicles, was to mark oneself as utterly out of fashion and was equivalent to proclaiming one's origin in the country districts.

Suppositions are often wrong and none more wrong than this. Our country cousins are just as anxious to be up-to-date as our city ones can be and they certainly equal, if they do not exceed, the city dwellers in their desire to have the latest. On this account the small-wheeled auto has found its way to every portion of the country, and wherever it has gone it has proclaimed the same truth that small wheels do not roll over obstacles so easily as large ones. The rocky country road or the cobblestone city street alike teach this lesson, and if there is any difference in the requirements with the respect for wheel sizes, it is the average city with its irregular cobblestone street which needs the large wheels, rather than the less used and therefore less worn-out country road.

As a result of learning these facts, standard automobiles have each year been increasing their wheel sizes until to-day we see vehicles like the American Roadster and the American Traveller with 40-inch wheels all around, and these large wheels equipped with four-inch tires, a size that but a few short years ago was looked upon as foolish. On the Austin 60 we find 37-inch wheels front and rear, and five inch tires. Of the autos to be shown at the Grand Central Palace show, by far the greater number of the higher priced vehicles will be equipped with 36-inch wheels, and four, four and one-half and five-inch tires. In the Chadwick we see 36 by 4 fronts, and 37 by 5 rears.

To make more clear the comparison, right alongside of these conventional autos do we find the Holman motor buggy recognized for years as the leading maker of this type, with 42-inch front and 44-inch rear wheels, and the McIntyre with 34-inch wheels all around, with 13-4 solid tires. The Duryea buggyaut is equipped with 38-inch front and 44-inch rears, so that from these examples it will be seen that the motor buggy and the conventional auto are now very close together in the matter of wheel sizes, and that wheel diameter is no longer a mark by which one can say that the vehicle was built for city or country.

On the contrary, busy business men in the cities are recognizing the advantage of large wheels and are demanding same whether fitted with pneumatics or with solid tires, that they may roll smoothly and with less damage to the mechanism over the car tracks, sidewalk crossings, stony streets and rough places found in all our American cities. In the lighter vehicles, particularly those of moderate price, the small wheel diameter is still retained, but even here the effect of the advance in public opinion can be seen, for tire sections have often been increased.

Points on Clutches and Brakes

The clutch is the device by which the gasoline engine is enabled to pick up its load gradually and smoothly, and having gotten

it started, continued to transmit the power positively. The brake is a device for absorbing the energy stored in the vehicle, gradually and smoothly, until the vehicle comes to a standstill, when it positively holds against further motion until the brake is released. Both devices are in almost constant use while an auto is being driven. Often the brake is applied without disengaging the clutch and often the clutch is let in with the brake still partly applied. Although working in reverse directions their service is identical and there is no reason why a good brake may not be substituted for the clutch, or a good clutch substituted for the brake.

It is a peculiar manifestation of habit, imitation, or like thinking among designers that the brakes in common use very closely resemble each other and are with few exceptions what is known as band brakes, consisting either of a constrictive band to grip the outer surface of the drum attached to a rear wheel, or expanding bands adapted to enlarge into the inner surface of this drum. And, in fact, most cars are fitted with both these, generally on the same drums, but sometimes on different drums.

In a few instances shoes take the place of the bands, but these are usually several in number and closely resemble the band construction, one of the exceptions being the Duryea brake, which is a small steel shoe resembling the horse vehicle brake.

In clutches a considerable variety is found, some of them being expanding bands, some contracting bands, but by far the greater number are of the cone type, or of the multiple disc types. The cone clutch gets a gradually increasing friction by being forced into a cone surface in the flywheel, until it takes up the load and drives positively. Its shape, however, renders it easily withdrawn whenever desired to unclutch. Generally this type of clutch is faced with leather to render it more smooth in operation, and it is found on a wide variety of automobiles, such as the Mitchell, Regal, Moline, Overland, Stoddard-Dayton, Pullman, Mora, Pennsylvania, National Speedwell Marmon, Standard, Acme and Welch. Among the users of the multiple disc are the Austin, Premier, Glide, Dorris, Ohio, Jackson, Marion, Pierce, Maxwell, Overland, Ford, Reo, Brush and many others. The Atlas employs an internal expanding ring clutch. The Midland clutch is of the floating disc type. The Moon has expanding bands, and a number of others forms are used.

Why this wide variety of clutches and closely followed single design of brake is a question the designers themselves cannot answer.

Owing to the Difficulty in finding a suitable course for the two speed trials during the Prince Henry tour, there has been a delay in publishing the propositions. The one flat race is to be held in the vicinity of Berlin; the second was almost definitely fixed for the Limburg-Weilburg stretch of the Taunus course, but on second consideration there are too many turns here to permit the vehicles being fully extended over so comparatively short a distance, and a route is being searched for on Alsatian territory. The second event may be run in the Hagenau Forest.

COLUMBUS SHOW OPENED BY OHIO'S GOVERNOR

COLUMBUS, O., Dec. 27.—Under conditions most auspicious, the first automobile show in the history of Columbus, and one of the first shows in the Middle West for the present season, was officially opened Christmas night at 8 o'clock by Governor Judson Harmon of Ohio. The chief executive of the Buckeye State by a slight pressure of an electric switch turned on the current which lit up thousands of lights in every part of the huge Columbus Auditorium, where the display is taking place. The act of the governor was prefaced by a few remarks in which he commented on the rapid strides being made by the automobile industry and the good work being done by the Columbus Automobile Club, under which organization the show is being held.

There were about 83 cars on exhibition when the show opened, and because of the congested condition of traffic on the railroads a few cars were delayed. They were placed on exhibition later in the week. Every available square foot of space is taken up with the automobile and accessories displays, and the first night the crowd was all that could be desired. It was society night, and the "400" of Columbus was out to view the 1910 cars. The cars are exhibited entirely by dealers with the exception of local factories, which fact added more local interest to the show. The number of different makes numbered 43.

When the doors of the huge auditorium were thrown open and the crowds rushed in, surprise and appreciation were expressed on all sides for the beautiful decorations. The interior of the hall is covered with white bunting trimmed with red. Everything is in keeping with the Yuletide period. Opposite the entrance is a huge automobile wheel constructed out of hundreds of various colored electric lights. Scattered in excellent order throughout the hall are many artificial palms and other flowering shrubberies which were decorated with many colored electric lights. The floor is covered with green burlap, which affords an excellent background to display the cars to the best advantage.

One of the features of the decorations is a large number of canary birds which are concealed in the foliage of the artificial shrubberies. When the lights were turned on by the governor the birds started to sing, and this, together with the orchestra,

which rendered music at frequent intervals, completed the stage setting for what has been pronounced one of the most beautiful of shows.

Special rates have been granted by the Central Passenger Association, and it is believed that fully 50,000 visitors will pass through the doors during the week.

The proceeds from the exhibition are to be used in erecting a clubhouse for the Columbus club, a large and flourishing organization. The committee on arrangements consists of Perin B. Monypeny, chairman; Herman Hoster, Harry D. Sims, Norman O. Aeby and Dennis Kelly. Max Morehouse is president of the club, and Arthur Crumrine is publicity agent.

The complete list of exhibitors and cars shown are as follows:

O. G. Roberts & Co., Stearns, Stoddard-Dayton, Overland, Lexington, Jackson.

Love Automobile Co., White gasoline, Cole "30."

Maxwell-Brascoe Columbus Co., Maxwell.

Broad-Oak Auto Co., Pierce-Arrow, Chalmers-Detroit, Hudson.

Kimmel Bros., Speedwell.

R. C. Wescott, Regal.

Ohle Motor Car Co., Ohio.

Franklin Motor Car Co., Franklin, Reo.

Central Ohio Motor Car Co., Oldsmobile, Oakland.

Studebaker Automobile Co., Studebaker, E. M. F. "30." Flanders "20."

Early Motor Car Sales Co., Rambler, Babcock Electric.

Columbus Buggy Co., Columbus Electric, Firestone-Columbus.

McDonald Auto Co., Buick.

Robert F. Boda Auto Co., Mitchell, National.

Charles Schear Motor Car Co., Hupmobile, Velle.

American Auto Co., American "40" Traveler.

United States Carriage Co., Rauch-Lang, Apperson, Great Eagle.

F. E. Avery, Packard, Waverly Electric.

Curtin-Williams Co., Cadillac, Peerless, Winton.

Oscar Lear Automobile Co., Frayer-Miller trucks.

W. A. Paterson, Paterson.

Franklin Cycle and Supply Co., Demotear.

Accessories: Welton Auto Fender Co., fenders; Williams & Scherbert, tire inflators; Berndt-Johnson Auto Supply Co., automobile bodies and supplies; Cleveland Puncture Proof Tire Co., tires; Central Ohio Oil Co., oils; A. C. Edwards, motorcycle; Columbus Auto Brass Co., lamps and parts; Rubber Tire Repair Co., repaired tires; Motor Supply Co., automobile accessories; Eckel Tire & Rubber Co., tires.

BLUEGRASS SHOW TO BE IN LOUISVILLE

LOUISVILLE, Ky., Dec. 24.—The Louisville Automobile Dealers' Association has decided to hold a show next March. At a meeting of the dealers a committee was appointed to select a place for holding the exhibition. No definite decision has been reached, but it is generally expected that an effort will be made to secure the Armory, said to be the largest building in the South. Several new members have been admitted to the association recently, and the exhibition this year will be on a much larger scale than ever before.

PORTLAND PREPARES FOR FOURTH ANNUAL

PORTLAND, Me., Dec. 27.—According to Manager F. M. Prescott, Portland's fourth annual auto show will be held during the last week in February. It gives every assurance of being the biggest and best yet held. All the floor space has already been rented, and there are only a few sections in the basement of the big Portland Auditorium which yet remain to be taken.

That the space for the show has been in such early demand is due to the fact that Maine dealers are looking for the biggest business in 1910 the State has ever enjoyed.

BALTIMORE CLUB'S SHOW IN FEBRUARY

BALTIMORE, Dec. 27.—The fourth annual automobile show to be held in Baltimore, and the second one to be under the direction of the Automobile Club of Maryland, will take place February 22 to 26, inclusive, at the Fifth Regiment Armory. This announcement was made by President C. Howard Millikin, of the club. It will follow the exhibition in Buffalo. It was originally intended to have the display the latter part of January, right after the Philadelphia show, but it was not certain that the Armory could be had. When the Regiment officials gave their consent Washington had taken the January dates.

RAMBLER HOLDS OWN NEW YORK SHOW

Following its custom, the Thomas B. Jeffery Company will not exhibit at either of the New York shows. However, to afford the many show visitors a better opportunity than usual to view the 1910 Rambler models, the Rambler Automobile Company of New York announces that it will hold an exhibition in its show-rooms, at 38 and 40 West Sixty-second street, just off Broadway, during the fortnight from January 1 to 15. Invitations have been issued to the trade, and all interested are asked to attend.

THE AUTOMOBILE

Vol. XXI

Thursday, December 30, 1909

No. 27

THE CLASS JOURNAL COMPANY

B. M. SWETLAND, President

A. B. SWETLAND, General Manager

231-241 West 39th Street, New York City

EDITORIAL DEPARTMENT

A. G. BATCHELDER, Managing Editor

R. F. KELSEY, Associate Editor

THOS. J. FAY

MORRIS A. HALL

GEORGE H. GODLEY

W. F. BRADLEY, Foreign Representative

ADVERTISING DEPARTMENT

M. C. ROBBINS, Manager

LOUIS R. SMITH, New York

W. L. RALPH, 1035 Old South Bldg., Boston

FRANK B. BARNETT, Cleveland

C. H. GURNETT, 1300 Michigan Ave., Chicago

B. J. GILL, Detroit

F. W. VAN SICKLEN, Chicago

T. B. VAN ALSTYNE, Philadelphia

Cable Address - - - - - Autoland, New York
 Long Distance Telephone - - - - - 3040 Bryant, New York

SUBSCRIPTION RATES

United States and Mexico - - - - - One Year, \$3.00
 Other Countries in Postal Union, including Canada - - - - - One Year, \$5.00
 To Subscribers Do not send money by ordinary mail. Remit by Draft,
 Post-Office or Express Money Order, or Register Your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all book-
 stalls and agencies in Great Britain; also in Paris at 748 Rue de Rivoli.
 FRANCE—L. Baudry de Saunier, offices of "Omnia," 30 Rue Duret, Avenue
 de la Grande Armée, Paris.
 GERMANY—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
 The Automobile is a consolidation of The Automobile (monthly) and The Motor
 Review (weekly), May, 1909, Dealer and Repairman (monthly), October, 1909,
 and the Automobile Magazine (monthly), July, 1907.

THE SHOW IS NOW THE THING

Shows are a source of considerable expense to the automobile industry, and the day may come when possibly one national event of this character will answer for the entire country. One is inclined at this time to believe that a series of national exhibitions will be found the most advantageous in a country of such wide expanse wherein the motor-driven vehicle is certain to succeed all horse-drawn carriages and wagons. Once a year there comes the annual outcry about the disorganizing effect of the show circuit, with its utilization of the time and energies of the entire factory, from the highest officer of the company down to the minor employees. Frequently an inventory of the results fails to supply any substantial gains except of an indirect sort, and the impetus given to the industry itself is frequently lost sight of, though in this all makers of cars and accessories unquestionably benefit and to a far greater extent than many of them imagine.

Under the present plan, local shows more than support themselves, and are no longer a drain upon the manufacturer. Thus the show proposition reduces itself to national exhibitions alone. New York is a necessity; Chicago is equally and perhaps even more essential; and the day is near at hand when a third show of national

calibre may be required to satisfy the great country beyond the Rockies, which, with its magnificent distances and widely scattered cities, finds greatest use for the automobile in the conduct of commerce.

First of the New York affairs again comes in the Grand Central Palace show, under the auspices of the American Motor Car Manufacturers' Association. Housed in a building which is ill prepared to meet the needs of a vehicle display, the promoters have accomplished wonderful things in fitting the ungainly structure for the really extraordinary unfolding of 1910 automobile products which will be available to the public, beginning to-morrow afternoon and evening and extending for a week thereafter. Here one will see how great the industry has expanded, for this show contains all the newcomers who have qualified to obtain a place in the procession.

With the gradual disappearance of patent litigation difficulties there comes the prediction that another year may see a fortnight in Madison Square Garden for the public telling of the story of automobile-making, for, unfortunately, it is a fact that even this big amphitheater and its overflow halls and basements cannot total sufficient room to meet the entire situation. Hence, there might come a week for those who were first on the scene, followed by the appearance of others entitled to show-room in the big tent.

But the 1910 metropolitan show fixtures call first for a visit to the Grand Central Palace, and then the sequence follows in Madison Square Garden. It will be a most reassuring and wonderful assembling of all that appertains to automobiling; and nowadays, the man who buys never runs the risk that was involved in the earlier purchase of motor-propelled vehicles.

When the first show was held in Madison Square Garden ten years ago, space was so abundant that about half of the main floor was taken up by a track. Around this the cars on exhibition were run, at the request of prospective buyers, to show that they really would go. Outdoor demonstrations did not come into vogue till several years later. To those who can recall these earlier exhibitions that of 1910 will be a notable contrast.

To-day to New York City the two annual automobile shows are perhaps the greatest events, in that line, of the whole year. The horse show, their natural rival, has admitted defeat, on the unanimous decision of the hotel-keepers that it was far outstripped in attendance. Other exhibitions which might have competed, such as those of electrical and business appliances, have been "out of the running" for several years.

A survey of the past decade brings with it a realization of the great progress made in automobile manufacture. In some of its aspects the improvement is stupendous in its proportions, and herein the man who intends to add aerial travel to his automobile accomplishments bases his hopes for early progress in this direction. Mayhaps that which came about in France may be repeated in this country—the replacing of the automobile show with an exhibition of aeronautical craft. In this country the indications are that we shall have both, and the second in a sporting rather than in a practical sense.

TENTH GARDEN SHOW WILL BE MOST ARTISTIC

WHILE chickens are cackling overhead during the session of the Poultry Show, carpenters, designers, plasterers, painters, and signmakers are zealously engaged in the basement of Madison Square Garden preparing the details of the magnificent decorative setting for the cars to be exhibited at the Tenth National Automobile Show. Next week they will take possession of the entire building, and the work will be pushed night and day until 8 o'clock on Saturday evening, January 8, when the doors of the Garden will be open from noon Friday, January 7, to 6 o'clock Saturday evening for the installation of exhibits.

The Garden show each successive year is proclaimed by the public and the tradesmen to be a bigger and better one in every way than its predecessor. This verdict is due chiefly to the untiring efforts of the show committee, who are the pioneers in many methods of show management that are now generally accepted in this country and abroad as a matter of course. The show committee is composed of Col. George Pope, chairman; Charles Clifton, and M. L. Downs, secretary.

Col. George Pope is a pioneer in the automobile industry, having been connected with it since 1897. He is treasurer of the

Pope Manufacturing Company, and has been chairman of the A. L. A. M. show committee for four successive years.

Charles Clifton has been prominently identified in the industry since 1898. He is the president of the Association of Licensed Automobile Manufacturers and treasurer of the George N. Pierce Company.

Merle L. Downs, secretary of the committee, managed several big automobile events in the early days of racing and touring. He has been in many branches of the automobile business, and for the past six years has attended to the detail work in connection with all the A. L. A. M. shows.

Coker F. Clarkson, the assistant general manager of the Association of Licensed Automobile Manufacturers, though not a member of the show committee, has been prominently identified with it. Mr. Clarkson is a lawyer who found a greater interest in engineering matters, and from electrical experimenting he stepped into the A. L. A. M. as secretary of its mechanical branch. He has edited various engineering publications which have been most favorably commented upon by the engineering profession. He is the compiler of the A. L. A. M. handbooks.

CHICAGO SHOW TO HAVE NOVEL DECORATIONS

CHICAGO, Dec. 27.—The ninth annual automobile show, held in this city February 5 to 12 under the auspices of the National Association of Automobile Manufacturers, will prove a revelation to the automobile world in its decorative scheme, if in nothing else. Manager Samuel A. Miles believes that he has succeeded in his aim to present a setting that will in no way permit of comparison with past efforts. In short, this show will be held in a forest.

This will necessitate the use of about 100 real trees, of which twenty will be two feet in diameter and seventy feet high; about a mile and a half of brick wall, real bricks; and the same amount of vine-covered iron railings; about 80,000 square feet of trellis work and pergola; 150 ornamental vases; 200,000 leaf sprays and flowers; four fountains of real water, and 150,000 square feet of paintings. No sign of the roof will be visible. The walls and the roof will be entirely covered with foliage and blue sky.

Mr. Miles reports that he has assigned spaces to 250 manufacturers of automobiles, motor cycles, part and accessories for the coming show. The list of automobile exhibitors includes the names of many new firms which have come into the limelight since the last exhibition. In order to accommodate more exhibitors this year it was found necessary to limit the spaces. In all, ninety-five automobile manufacturers have been given spaces on the main floor of the Coliseum and the Annex, the basement of the Annex and the main floor of the First Regiment armory.

The motor cycle department will again be an interesting feature. Spaces have been assigned to twelve makers of the two-wheelers on the second floor of the Annex. The parts and accessories firms have been taken care of in the galleries of the Coliseum and the First Regiment armory. As usual, the Chicago show will be national in its scope, and both licensed and unlicensed makers will exhibit their products under the same roof.

A. A. A. MEETINGS DURING SHOW WEEKS

THE American Automobile Association will have space at both the New York shows. Representatives of the association will be in attendance, and members are invited to make use of the booth, where a telephone will be provided and everything possible arranged for their comfort. At the Grand Central Palace show headquarters will be at space 300. At the Madison Square Garden show headquarters will be at space 327 in the Concert Hall.

The Automobile Association of London, with which the A. A. A. has reciprocal arrangements, will have a representative in attendance at both booths and information will be gladly given regarding the facilities afforded by this great motoring organization to those contemplating touring abroad. A. A. A. members can join the A. A. of London upon payment of one-half the regular annual subscription.

During the week of the show at Grand Central Palace the first meeting of the Good Roads Board for 1910 will be held at

National headquarters, 437 Fifth avenue, Thursday, January 6, at 10 o'clock, Chairman George C. Diehl presiding.

During the week of the Madison Square Garden show the following meetings will be held at National headquarters, 437 Fifth Avenue, unless otherwise indicated.

Tuesday, Jan. 11, 10 A. M.—A. A. A. Executive Committee monthly meeting, President Lewis R. Spear presiding.

Wednesday, Jan. 12, 11 A. M.—Legislative Board, Chairman Charles Thaddeus Terry, presiding.

Thursday, Jan. 13, 10 A. M.—Directors' meeting, New York State Automobile Association, President H. A. Meldrum presiding. To be held at Hotel Belmont.

Thursday, Jan. 13, 2 P. M.—Touring Information Board, Powell Evans, Chairman, presiding.

Friday, Jan. 14, 10 A. M.—Second Annual Reunion A. A. A. State and Club Secretaries, Frederick H. Elliott, Secretary, presiding. Luncheon at 1 o'clock.

A. A. A. members holding certificates for reduced railroad rates should present the same for validation promptly.

COURT RULES E-M-F CAN SELL INDEPENDENTLY

DETROIT, Dec. 27—According to the finding of Judge Severens, of the United States Circuit Court, the E-M-F Company of this city was fully justified in rescinding the selling agreement it entered into with the Studebaker Automobile Company, last April, and is at liberty to handle its own product.

Some two weeks ago President Walter E. Flanders, of the E-M-F Company, it will be recalled, abruptly terminated the relations up to that time existing between the two concerns, serving notice on the Studebaker Automobile Company that thereafter the Detroit concern would market its own products. The Studebaker officials, who constituted the minority stockholders in the E-M-F Company, immediately sought to have Judge Swan, of the local United States Court, issue a peremptory restraining order against the E-M-F Company, to prevent the summary severance of relations and the selling of cars through any other medium than the Studebaker Company. Judge Swan declined to take this step, stating that he would decide the case on its merits as they might be presented to him on a date set. Then counsel for Messrs. Fish, Studebaker, and Eames, of the Studebaker Company, stole a march by securing a temporary restraining order from United States Circuit Court Judge Severens, of Cincinnati.

When the matter came up at Kalamazoo, Mich., last Friday, for final settlement, Judge Severens denied the application of the Studebaker officials for an injunction to prevent the E-M-F Company selling its cars to independent dealers, holding that the latter company was justified in rescinding the selling agreement, whose alleged non-fulfillment on the part of the Studebaker Company proved the bone of contention, and leaving the Detroit company free to market its cars as it sees fit.

The only point questioned by Judge Severens at the preliminary hearing was whether the action of the majority directors was really the corporate act of the company. In rendering his decision, Judge Severens did not touch upon this phase of the matter, evidently having satisfied himself fully.

Immediately after the reading of the decision counsel for the Studebakers called attention to the fact that there was pending before Judge Swan in the United States circuit court here another case, brought by the Studebaker Automobile Company, and asked Judge Severens to hear it, on the grounds that he was already familiar with the facts, and that Judge Swan would not be able to do so. Counsel for the E-M-F interests promptly question Judge Swan's inability to handle the case, and after considerable argument on both sides, Judge Severens stated he would hear the case if Judge Swan requested him to do so, but that under no other condition would he interfere. Studebaker counsel pressed the point, and acting on the supposition that Judge Swan would not hear the case, it was set by Judge Severens for a hearing at Cincinnati, January 3.

It developed that what the Studebaker Company really was after was another restraining order which would tie the E-M-F officials up until the other case could also be heard, thus causing another ten days' delay. When the matter was put up to Judge Swan he promptly declared that inasmuch as the original action had been taken before him he considered it his duty to hear it, and set the case for Monday morning, December 27.

Latest Move in Court

DETROIT, Dec. 28—When the Studebaker case against the E-M-F came up before Judge Swan Monday morning the Studebaker lawyers asked permission to withdraw the motion for a temporary order to restrain the E-M-F company from going on with the sale of cars, and to also withdraw the bill of complaint, without prejudice and at the cost of the Studebaker company. E-M-F attorneys had no objection to the withdrawal of the motion for a temporary restraining order, but, believing that the withdrawal of the bill of complaint was merely a step toward clearing the way for action in some other court, asked that if the court granted such permission it be accompanied by an order stopping further proceedings against the E-M-F company.

Judge Swan promises a decision at an early date.

REAL AUTOMOBILE NEWS FROM THE PINE TREE STATE

PORTLAND, Me., Dec. 27—That the coming of cold weather has little effect upon the automobile business of Maine is clearly evidenced by the figures which have just been compiled at the office of the Secretary of State in Augusta. The record of registration of automobiles, according to the figures, shows that for the past 11 months of the present year 1,614 machines were registered; the number of licenses issued to operators was 1,788; the number of motorcycles registered was 133, and the number of licenses issued to dealers was 42. From these sources the total receipts in fees amounted to \$5,486, divided as follows: From registration of automobiles, \$3,224; from licenses issued to operators, \$3,576; from registration of motorcycles, 266, and from licenses issued to dealers, \$420.

During the month of November, when the trade in a State so far north as Maine is thought to be at a standstill, the number of automobiles registered was 34 and the amount received in fees was \$68; the number of licenses issued to operators was 30, and the amount received in fees was \$60; the number of licenses issued to dealers was four, from which \$40 was received.

The number of automobiles which have been registered since the law went into effect in June, 1905, is 4,846, and the number of licenses issued to operators during that time is 5,578. The number of motorcycles registered is 472, and the number of licenses issued to dealers is 123. The total amount received in fees since the law went into effect is \$23,012, which is divided as follows:

From the registration of automobiles, \$9,693; from licenses issued to operators, \$11,156; from registration of motorcycles, \$944, and from licenses issued to dealers, \$1,230.

Reviewing the automobile season in Maine which has just come to a close, it may easily be said to have been the most successful the State has ever enjoyed. Conservative business men, those who at first it was thought could not be brought to the use of the automobiles, have taken up the new means of locomotion, and many of them, although well advanced in years, may be seen about the streets of Portland, Bangor and the other cities of the State driving their own cars. Doctors in particular have recognized the usefulness of the horseless carriage.

Auto Tourists in Plenty—It is estimated from the figures of the Maine railroads that fully 250,000 people visited this State during the vacation season of 1909. That is the number that came by train, but it does not by any means even hint at the thousands that came by automobile. In fact, there has been a general complaint that the automobile has cut into the business of the steam lines, for hundreds of people who formerly came that way have entered the State in their touring cars.

The commercial vehicle has yet to make a pronounced impression in the State, but it is being slowly adopted. Several smaller ones are used in Portland and at Poland Springs and Rockland the Ricker Brothers are using the big Stanley passenger car for the transportation of guests to the mammoth hotels.

Latest Doings of the Clubs

BISONS ELECT ENOS TO CLUB PRESIDENCY

BUFFALO, Dec. 27.—About seven hundred members of the Automobile Club of Buffalo attended the annual meeting and election of officers. The new official roster includes the following: Laurens Enos, president; Harry Thorpe Vars, vice-president; Dai H. Lewis, secretary; Donald Mackay, treasurer; Edward H. Butler, Charles Clifton, Edwin R. Thomas, George C. Diehl, George P. Urban, John G. H. Marvin and Maurice M. Wall, directors.

A silver loving cup was presented to retiring President John M. Satterfield.

It is the custom of the club that a president shall have only a single year in office. President Satterfield's report reviewed the work of the club during the year, including the launching of the official monthly, the *Buffalo Motorist*, which has yielded a net revenue of \$1,698.75 to the club; the institution of the club dashboard emblem, the distribution of road maps, including the new map of Erie County; the automobile show of 1909, which gave a net profit of \$2,700 to the club after paying a dividend or rebate of over 51 cent to the exhibitors; the one-gallon gasoline contest which established a new world's record; the warfare against the Williamsville speed trap, in which the club defended all who were arrested and secured a reversal of the convictions in the justices' court and the repayment of all moneys exacted under the guise of fines; the winning of the Glidden and Hower trophies by members of the club; the institution of new steel-enamelled road signs; the warfare by the club on automobile thieves, resulting in the recovery of all of the 63 cars stolen and the sentencing of eight of the thieves to prison for terms ranging from 20 days to 31-2 years.

The treasurer's report showed a balance of \$4,551.19 in the treasury. The club spent \$300 in rewards for the arrest of automobile thieves and \$212 in smashing the Williamsville speed trap.

Secretary Lewis reported that the club's total membership is 1866, of which 612 were added this year and 105 within the last 30 days.

The club will send a delegation to attend the A. A. National Automobile Legislative Convention, which will meet in Washington in February in the interest of a Federal motor registration law and a uniform State law throughout the country.

DENVER MOTOR CLUB READY FOR NEW YEAR

DENVER, Dec. 24.—The Denver Motor Club will start the new year with all its objects outlined beforehand and a new set of officers. At the election held recently William D. Nash was elected president, Dr. J. N. Vroom vice president, E. C. Healy secretary and C. P. Allen treasurer. This makes a complete change of officers, with the exception of Mr. Allen, who has held the position of secretary since the organization of the club. The board of governors for the following year consists of the above-named officers with the addition of Morris Mayer, Dr. S. D. Hopkins, W. H. Sharpley, Dr. E. F. Dean and George E. Cartwright.

The work which has been outlined for the coming year embraces a strenuous campaign for good roads, the erection of many new signboards, the biggest and best automobile show ever held west of Chicago (to open March 23), a 200-mile road race on Decoration Day, a reliability contest in June, another road race on Labor Day, an economy contest in October and a hill-climb in November.

Within the last two months the commissioners in Weld, Adams, Jefferson, Douglass and El Paso counties have had a number of men at work on the roads. The club has made a general canvas and has found in almost every section that the land owners, ranchmen and farmers are ready to assist the labor in any way. Many of them have offered funds as well as labor, teams and implements.

MILWAUKEE CLUB'S SHOW STRIKES A SNAG

MILWAUKEE, Wis., Dec. 27.—Representatives of twenty-five well known makes of automobiles in Milwaukee have issued a public statement announcing that they have mutually agreed not to display their cars in the second annual automobile and motor show of the Milwaukee Automobile Club, in the Auditorium, from February 22 to 27.

"Believing the expense of exhibiting will be greater than the profits to be derived from the show," the announcement says, "we will not exhibit at this coming show." The agencies are:

Mitchell Automobile Co., Mitchell; Rambler Garage Co. of Milwaukee, Rambler; Sanger Automobile Co., Oldsmobile, Maxwell, Stearns; Curtis Automobile Co., Reo; Jonas Automobile Co., Peerless and Cadillac; Welch Bros. Motor Car Co., Packard and Rauch & Lang electric; Alkin Motor Car Co., Stevens-Duryea and Columbus electric; Emil Estberg, Pope-Hartford, Waverly and Woods electric; Hickman, Lauson & Diener Co., Ford; Waite Bros., Moline; Riverview Automobile Co., Moon; Bates-Odenbrett Auto Co., Overland, Marion, Winton; Albert Smith, Palmer & Singer; American Automobile Co., Pierce-Arrow, Apperson, Babcock electric.

Each of the fourteen agencies will conduct private shows in their respective garages. They claim unfair treatment from the Milwaukee club, but the nature of this is not given out. President Clarke S. Drake, of the M. A. C., says that he is not aware of any unfair treatment, and while regretting the attitude of these dealers, believes the club will be able to get along without them. All space has already been contracted for, which gives promise of a show at least 75 per cent. larger than the first show held in the Milwaukee Hippodrome last March.

SALT CITITLES PLAN MUCH FOR 1910

SYRACUSE, N. Y., Dec. 27.—The Automobile Club of Syracuse did things during 1909, and its members have a right to congratulate themselves upon results attained. During the Summer a fine room, principally for the convenience of tourists, was located on the second floor of the S. & A. K. building, on East Genesee street. A club publication, the *Spark Plug*, is about to be launched. The club ends the year with a total membership of 390, a gain since the first of July alone of 150. The officers of the club say that in the week remaining of 1909 they'll get another ten, making an even 400 to begin 1910.

The results attained are due principally to the efforts of President Hurlbut W. Smith, Secretary Forman Wilkinson, and the assistant treasurer, Miss Grace L. Tickner, who has proved a veritable dynamo in the interest of the club.

The club was started in 1902, and Fred H. Elliott, present secretary of the American Automobile Association, was its first secretary. The present recruiting movement is the most ambitious one the club has had, and it is by no means finished yet. Five hundred members is the goal, and it is confidently asserted the club will have them by the early part of the Spring. Not only has the club done a great amount of road and danger sign work, but it has had a potent effect upon legislation at Albany.

BAY STATERS INSPECT INTERESTING TESTING DEVICES

WORCESTER, MASS., Dec. 27.—The Worcester Automobile Club, Wednesday evening, was given a demonstration at the new automobile testing plant of the Worcester Polytechnic Institute. The apparatus is the invention of Prof. D. I. Gallup, professor of gas engineering in the department of mechanical engineering at the Tech, and the demonstration Wednesday night was the first public one given. The apparatus is on the street level of the building and permits a car to be run in directly to the testing wheels. On the wall facing the driver while his car is being

tested is a chart ruled with lines and curves. The horizontal distances represent the rate of speed in miles per hour and the vertical distances the draw-bar pull. From these two factors are plotted curves which represent the horsepower and per cent. of grade. In front of the chart are strung two automatically controlled ribbons, one of which is horizontal but which moves up and down, the other is strung vertically and moves back and forth and represents the speed. The horsepower and the per cent. of grades are indicated on their respective curves by the varying point of intersection of the two ribbons. The apparatus is designed to operate at speeds representing a maximum of 60 miles per hour and a draw-bar pull of 1,500 pounds and to grades of 25 per cent.

In addition to the testing plant Prof. Gallup has on exhibition an optical monograph which, by means of a tilting mirror mounted on a flexible diaphragm can, when connected to the combustion end of a gas engine cylinder, be made to project an electric arc upon a ground glass screen in such a manner as to indicate the changes of pressures which take place in the cylinders. An elaborate piece of apparatus designed to show the effect of different types of ignition and spark plug combinations is also shown. By rotating this device at different speeds the conditions and reliability of the sparking devices can be shown as they would occur if the automobile was running at different rates of speed.

NEW OFFICERS AND NEW CLUB HOUSE.

NEW ROCHELLE, N. Y., Dec. 24—Very commendable was the meeting of the New Rochelle Automobile Club held recently. This was the annual meeting, and officers were elected as follows: President, W. B. Ogden, Jr.; first vice-president, Edmund Eckart; second vice-president, G. W. Bennett; treasurer, F. D. Le Count; secretary, F. M. Carpenter. The sum of \$4,000 was subscribed as the first payment on the new \$25,000 club house. The activity of the club has resulted in the reduction to the ranks of an obnoxious motorcycle officer and the putting of the other plain-clothes motorcycle officers in uniform. By its prompt action in this case the club gained many friends.

A. C. OF PHILADELPHIA PASSES 1,000 MARK

PHILADELPHIA, Dec. 20—At last week's meeting of the board of governors of the Automobile Club of Philadelphia, Secretary S. Boyer Davis' report showed a total membership of 1,014. The passing of the thousand mark has given impetus to the club-house idea, and Chairman D. Braden Kyle, of the club garage committee, who has been quietly investigating the matter during the past twelvemonth, is said to be loaded to the guards with data, which, when presented to the club at a meeting in the near future, will result in the authorization to go ahead with the work of providing splendid headquarters for the club in the central part of the city. Besides the garage and the usual equipment of the up-to-date club house, the plans contemplate a library and squash and handball courts.

The Automobile Club of Germantown is continually outgrowing its splendid quarters at Carpenter and Emlen streets. Two additions have already been made to the original building, and now numerous local architects are estimating on a 62 x 90 feet addition that will cost \$15,000, the work to be begun next Spring.

QUAKERITES ARE BUST THESE DAYS

PHILADELPHIA, Dec. 27—The Quaker City Motor Club will present each member with a copy of the 1910 "Official Automobile Blue Book" as a New Year token. President Berger will name two delegates to attend the National Legislative Convention of the A. A. A. at Washington, D. C., next February. A donation of \$100 was made to the pension fund of the Fairmount Park guards. The annual dinner, Thursday, January 6, at Hotel Walton, promises to be a record-breaker. A feature of the affair will be an exposition of the new rules of the A. A. A. Contest Board by Chairman S. M. Butler.

A mix-up with the Contest Board has necessitated the postponement of the New Year's run of the Century Motor Club. An eleven-hour change in the entry blank, which was insisted upon by the chairman, allowed insufficient time for the securing of new entries, and the run may be held during the coming show of the Philadelphia Automobile Trade Association January 15-20.

THE AUTOMOBILE CALENDAR

Shows and Meetings.

Dec. 31-Jan. 7.....New York City, Grand Central Palace, Tenth International Automobile Show; American Motor Car Manufacturers' Association, with Importers' Automobile Salon and Motor and Accessory Manufacturers. Alfred Reeves, General Manager, 505 Fifth Avenue, New York.

Jan. 4.....New York City Automobile Club of America. Annual Meeting, Society of Automobile Engineers.

Jan. 5.....New York City, Waldorf-Astoria Hotel, Annual Meeting Motor and Accessories Manufacturers. Inc.

Jan. 7.....New York City, Manhattan Hotel, General Meeting Manufacturers' Contest Association.

Jan. 8-15.....New York City, Madison Square Garden, Tenth National Show, Association of Licensed Automobile Manufacturers.

Jan. 13.....New York City, Engineers' Society Building, Adjourned Meeting, Society of Automobile Engineers.

Jan. 17-22.....Philadelphia, Second Regiment Armory, Automobile Show, J. H. Beck, Secretary, 216 Odd Fellows' Building.

Jan. 17-22.....Kansas City, Mo., Annual Automobile Show of the Motor Car Trade Association of Kansas City. P. S. Sutermeister, Secretary, Midland Building.

Jan. 24-29.....Detroit, Wayne Hotel Gardens, Third Annual Automobile Show, Detroit Auto Dealers' Association. John Gillipie, Manager, Hotel Tuller.

Jan. 24-31.....Washington, D. C., Convention Hall, Automobile and Aeronautical Show, Automobile Dealers of Washington. B. R. Johnson, Manager, 1313 New York Avenue, N. W.

Feb. 5-12.....Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.

Feb. 14-19.....Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Iml H. Lewis, Manager, 760 Main Street.

Feb. 14-19.....St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington Avenue.

Feb. 19-26.....Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmut, Chairman, Hotel Nicolet.

Feb. 19-26.....Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26.....Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association, W. D. Rishel, Manager, 1-5 East First South Street.

Feb. 21-26.....Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-27.....Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26.....Hinghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3.....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Secretary.

March 5-12.....Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park Square.



The Law and The Automobile

WHAT MICHIGAN'S NEW LAW CONTAINS

DETROIT, Dec. 27—Several important changes are embodied in the motor vehicle laws, which go into effect January 1. Under the new order of things all registrations will expire December 31 of each year, and may be renewed at a cost of \$1. Each new registration will hereafter cost \$3, instead of \$1, as formerly. It will also be compulsory for every purchaser of a second-hand machine to deposit \$1 with the secretary of state, and any dealer or individual selling a second-hand car must report the sale to the secretary of state's office within ten days.

Hereafter the driver of an automobile obstructing a highway must turn out for a motor car. At the same time the driver of the car must use every precaution to prevent the frightening of horses, and it becomes the legal duty of occupants of a car to render all possible assistance in the event of trouble.

The state law takes cognizance of the power of municipalities and townships to regulate the speed of automobiles, but in no event must the rate prescribed by them exceed the provisions of the state law, which is 25 miles in the country, and 10 and 15 miles respectively in the business and residence portions of cities. Upon approaching a pedestrian or team in the highway the motor car must be slowed down to 10 miles an hour, and notice of its coming must be given. Numbers must be displayed conspicuously on the front and back of each machine, and different colors will be designated each year.

A MARYLAND LEGISLATOR WITH A GRUDGE

BALTIMORE, Dec. 27—Former Mayor John A. Garrett, of Glen Echo, Montgomery County, noted as a terror to Washington and Maryland speedists, announces that he is going on the warpath again. He has been elected a member of the coming General Assembly of Maryland and he says that it was his purpose, in securing the election, to carry the battle against autoists to the legislature. Now he wants a special law which will permit the Montgomery County commissioners to impose a tax on autos that use any of the County's highways. This money he would employ in establishing a corps of special officers to patrol the County against speedists, particularly of Washington and the lower sections of Maryland. He says that these cars in the hands of speedists injure the roads more than any other kinds of vehicles combined. Glen Echo will be remembered by all who had occasion to pass through there during the last few years as the site of a particularly obnoxious trap, which the Automobile Club of Maryland finally succeeded in breaking up.

KENTUCKIANS CELEBRATE GOOD ROADS LEGISLATION

LOUISVILLE, Ky., Dec. 20—Automobilists, senators, mayors, merchants, and those who fought in the trenches for the cause assembled in the leather room of the Seelbach Hotel, Friday evening, in celebration of the victory of the Kentucky Good Roads amendment to the constitution. About eighty were present, and the betterment of the State highways was discussed from every angle. The affair began shortly after 8 o'clock with a banquet, over which Dr. Ben L. Bruner, Secretary of State, presided as toastmaster. What the amendment means to Louisville, Kentucky, and the farming and automobile industries of the State was the keynote of the addresses made by Senators Joseph F. Bosworth and G. T. Wyatt, Mayor William O. Head, Julius V. Beckmann, secretary of the Kentucky Good Roads Association, and M. C. Renkin, State Commissioner of Agriculture.

PENNSYLVANIA'S LAW IS NOW EFFECTIVE

PHILADELPHIA, Dec. 27—On Saturday morning next one of the most important provisions of the Keystone State's new automobile law will go into effect for the first time; that requiring the registration of cars and the licensing of drivers. It will be recalled that when the present law went into effect last Spring an exception was made of the clauses governing registrations and licensing, it being stipulated that in this particular the old law should remain in force until January 1, 1910. The new schedule provides for a sliding scale in registry charges—less than 20 horsepower, \$5; 20 horsepower and less than 30 horsepower, \$10; 30 horsepower and over, \$15 per annum. Owners or their relatives who might drive are not compelled to take out licenses, but paid chauffeurs will be required to pay \$2 each and to wear the official badge while on duty.

MICHIGAN'S NEW LAW SOON EFFECTIVE

LANSING, Mich., Dec. 27—There will be 15,000 automobiles in use in Michigan in 1910, according to the Secretary of State's office. Twelve hundred licenses were issued in 1909, and an increased number is expected this year. The fee for registration under the new law going into effect January 1 has been increased from \$1 to \$3.

Some of the provisions of the new law are a gain for users of automobiles. One provision makes it the imperative duty of teams ahead of an automobile to turn out and let the automobiles go by. A speed of 25 miles an hour is the limit allowed in the country, and in the cities 15 in the residence portion and 8 in the business portion. Numbers are to be displayed on both ends of the machine.

DELAWARE WANTS NO JOY RIDING

WILMINGTON, DEL., Dec. 6—Two city departments, the water department and street and sewer department, having provided themselves with automobiles for the use of their officers, *Every Evening*, a local newspaper, makes the suggestion, editorially, that all municipal machines be plainly lettered with the name of the department to which it belongs, one object being to guard against misuse of the machines by subordinates. There is reason to believe that in this respect some of the employees have been imitating the practice in certain larger cities.

There Is Hope! In his address to the grand jury of Potter County, Pa., Judge Ormerod, who, perhaps, never noticed them in his horse-driving days, called attention to the numerous "thank-ye-ma'ams" on the roads of that hilly country, characterizing them as "nuisances that must be abated." The judge has become an ardent automobilist, and the judicial vestibule have doubtless been oftentimes severely wrenched by these relics of a bygone age of road building, to call forth such a bitter arraignment.

The Interesting Law Suit between the Cannstatt Daimler Company and the Swiss motor car firm of Niegervet & Cie. has now been concluded after having been carried from one court to another. The Swiss high court, which had to definitely settle the plea for damages for infringing the Daimler radiator patents, fixed the sum Niegervets have to pay at 300,000 francs; Daimler demanded no less than 7,673,000 francs indemnity.



MOTORCYCLE TROUBLES

Editor THE AUTOMOBILE:

[2,131]—Will you please favor me with an answer to the following: I have a 4 horsepower air-cooled motorcycle which does not have as much power as it ought to on very steep hills. The compression is good, the timing as it should be, valve springs are right, but motor will run very fast on the level, very well on slow speed, having great pulling power when throttled down on moderate grades, yet when the throttle is wide open, the machine does not do what it should. What should I look for as the trouble? What should be the clearance space with a 34-in. piston, on an air-cooled engine? The motor uses an excessive amount of oil, which leaks out around the valves. If I do not use enough, smoke comes out around the crankcase. Would this indicate that the piston was too small? C. O. W.

Binghamton, N. Y.

Either the throttle valve is loose on its shaft or else all of the good things which you enumerate are not actually in existence on the machine at one and the same time. The loosened throttle valve would account for the very good pulling powers of the motor at slow speeds, that is, the throttle was probably open wider than you thought. On this basis, you expected to get much more power in proportion at wider openings, which could not come true for the reason that the throttle could not open any wider.

As to the clearance, that depends entirely upon the compression desired. Knowing the latter you can easily figure the former, or if you know what figure the manufacturer claimed as the latter, you can figure out what that means and check up on your cylinder to see if you have it. Thus, for a compression pressure of 50 pounds (gauge), the compression space should be roughly 47 per cent of the piston displacement; for 60 pounds, 41 2/3 per cent; for 70 pounds, 36 2/3 per cent, and for 80 pounds, 32 per cent.

This piston displacement is the area of the piston in square inches multiplied by the stroke in inches. While the usual compression pressures in motorcycles is not definitely known, in air-cooled automobiles, 50 to 60 pounds is more used than the higher pressures. From this, you would apparently want to find your engine giving between those two figures. Midway between the two would mean about 44 per cent of the piston displacement.

Just to show you how to figure it, suppose the stroke which you have not given is 3 1/2 in., then the area of the piston is 9.62 sq. in. Then, the piston displacement is 9.62 by 3 1/2, which is 33.67 cu. in., 44 per cent of this is 14.82 cu. in. for the clearance, or 48.49 cu. in. total.

GEAR RATIO'S INTEREST

Editor THE AUTOMOBILE:

[2,132]—What in your opinion is the best gear ratio for both three and four-speed transmissions, that is, the most practical and satisfactory, all things considered? Please give your answer in number of the crankshaft turns per one of the rear wheels. How are the Peerless "30", the Packard "30" and Stearns "30-60" geared? R.A.T.O.

Albany, N. Y.



LETTERS INTERESTING

This is a subject on which very little information is available, strange to say. It also varies greatly from one make to another, with the size of wheels, inclination of owner, country to be used in, service, etc. Thus, hill climbing calls for a much lower gearing ratio than ordinary use, while speed work calls for a much higher ratio.

Some of the cars which you mention are available, thus: Peerless 19 had 28.5 ratio on high with 36-in. wheels; Peerless 25 had 2.59 ratio on high with 36-in. wheels; Stearns 15-30 has 3.5, 4.8, and 10.6 to 1 respectively on high, intermediate and low gears, with 34-in. wheels; Stearns 30-60 has 2.78, 3.77, 5.5, and 11.2 to 1 respectively on high second, third, and low with 36-in. wheels.

Other gear ratios which may interest you are: Stevens-Duryea Model X, 3 to 1 with 34-in. wheels; Winton Sixes (both) 3.69, 3.2, 2.937, or 2.64, choice of these for high gear; 45 has 34-in. wheels and 60 has 36 in.; Thomas 16 town car, 4 to 1 with 34-in. tires; Thomas 6-40, 3.5 to 1 with 36-in. wheels; Thomas 4-50, choice of 2.78, 2.6, 2.36, 2.23 or 2.18 on high, with 36-in. wheels; Thomas 6-70, same as 4-60. There is remarkably little information available on this subject.

WOOD ALCOHOL IN FUEL

Editor THE AUTOMOBILE:

[2,133]—The writer has been told by a mechanical engineer that, if once a month one gallon of wood alcohol be introduced into the gasoline with the 14 gallons of gasoline and allowed to serve the cylinders through the carburetor as a fuel, this will result in keeping the spark plugs and cylinder interior free from carbon. What is your opinion on this subt? H. L. HOPKINS.

New York City.

It is doubtful if the wood alcohol and gasoline in the proportions you mention, will mix, the former simply floating on the latter. In that case, it is hard to see what good it will do. Similarly, with its use as a fuel, if it does not mix thoroughly with the gasoline, it will not burn at the same time as the latter, but separately, which would result in a very peculiar action on the part of the engine. That is, the alcohol would call for one adjustment of the carburetor and the lighter gasoline, another.

While the use of alcohol may not cause as much carbon to be deposited on the spark plugs and the interior of the cylinders, its use brings out other equally undesirable features, for instance, it is said to corrode valves and valve seats, eating into them in much the same manner that a weak acid or strong alkali would.

TWO-CYCLE ENGINE POWER

Editor THE AUTOMOBILE:

[2,134]—Please answer through the columns of "Letters Interesting, Answered and Discussed" what would be the power of a one-cylinder, two-cycle, three-port engine for an automobile having a 5-inch bore and stroke? B. H. M.

Morgantown, W. Va.

For automobiles, the usual rating used for two-cycle engines regardless of the number of ports or type, is the same as that for four-cycle, the assumption being that since the greater amount of power per cylinder has not been proven, the two are equal. On this basis, the size cylinder you mention (5 in.) would rate at 10 h.p.

A formula which has been advocated by Roberts, the two-cycle authority, gives a rating for this size depending upon the speed at which it is run of: at 1,000 r. p. m., 9.3 h. p.; at 1,200 r. p. m., 11.0 h. p.; at 1,500 r. p. m., 14.0 h. p. It is doubtful if the latter speed can be attained with a two-cycle engine, however.

Another rating formula advocated by the A. P. B. A. for marine racing engines gives this engine a maximum power of 9.6 h. p. For other marine use, the rating is but 2/3 of this or 6.4 h. p. In this, you should bear in mind that the figures are for very slow speed work such as is common with motor-boat engines.

CURE FOR KNOCKING

Editor THE AUTOMOBILE:

[2,135]—I note in your answer to letter number 2,102, relative to knocking in the two cylinders 2 and 3 that you suggested cold trouble. I had a similar experience, and when I lightened up the center bearing of the crankshaft the knocking stopped. Although the distance from the two bearings is short, nevertheless, the pressure in the center from the two cylinders, one on each side, could certainly spring the shaft enough to cause a knock if there was any play. Of course, the cylinders fire alternately with number 1 and 4, so that the knocking would not show much when the engine was running at high speeds. If the trouble was in the coil, he could change the connections 2 and 3 to the outside without much trouble. Reger, Mo.

PLATT OVERTON.

The first idea is a good one, but the last named, that is, the interchanging of terminals could not be done, as the timing would then be defective, and the engine would not run at all. If a wire was connected up to cylinder number 1 and then changed as this writer suggests to lead to cylinder number 2, the result would be that cylinder 1 would receive a spark at the correct time for number 2 and, vice versa, cylinder 2 would get a spark at the right time for cylinder 1. This would of course be incorrect for both, and the engine actually would not make a revolution, after this change had been made.



ANSWERED AND DISCUSSED



COLLISION LIABILITY

Editor THE AUTOMOBILE:

[2,136]—Will you please advise me as to the liability in the following case: If A driving an auto meets B also driving a car, the latter (B) giving a signal by means of his hand that he is going to turn around to his (B) left following the curve of the road at that point. A slacks up, and thinking to give B more room, turn to his own (A) left. B starts to turn to his left, then apparently changes his mind and turns back to his right, running into A at the point marked E. What is to blame? N. W. L. Plainfield, N. J.

The sketch below shows the scene of the collision, and the layout of the roads there, with two forks from the main road branching together to form a Y. Car B followed the course B C E as indicated by the heavy dotted line, while the other car proceeded along as per A D E, also indicated by heavy dotted lines.

As the case is told by the writer above, it appears as if the liability lies with A, although in turning out as he did he showed a kind heart and a tendency to think for the other fellow. Nevertheless, when he crossed the center line of the road at point D, he went wrong and for that he would be liable. His proper course would have been to proceed in a straight line as shown by the arrows, up to the intersection of the two roads F, where he should have thrown out his clutch until B passed or until the road was otherwise clear.

Had he done this, and had B driven as he did, changing his mind and his course at C, A would have been on the right side of the road somewhere between D and F, but wherever he was, he would have been in the right. Then, had B run into him, the latter (B) would have been in the wrong and therefore, liable. In another column we

print a tentative list of signals which would undoubtedly be valuable in such cases.

POINTS ON FRICTION DRIVE

Editor THE AUTOMOBILE:

[2,137]—Will you please advise me through "Letters Interesting, Answered and Discussed," what is said for and against the friction drive? As I am on the point of buying a new automobile in the medium-priced class, I would like to get an opinion on this. I am more interested in durability than speed. A. SUBSCRIBER. Crowley, La.

As for the drive, the arguments are lessened weight, lesser number of parts, simplicity, low first cost, ease of operation, and infinite number of speeds.

On the other side it is said that the friction form possesses many disadvantages, such as lack of holding power, too rapid wearing out of the friction surfaces with consequent expense and cost of frequent replacements.

The lack of holding power alone would more than counterbalance all favorable advantages could it be proven definitely. The fact that it has been impossible to prove this to the satisfaction of all concerned accounts for the continued existence and healthy growth of the companies manufacturing this form. Otherwise, they would have been obliged to go out of business long ago, for want of business support.

Manufacturers on this type of transmission say, also, that the frictional surfaces which wear out are very cheap in price, so that their cost is negligible, while the work of replacing them is also very small and inconsiderable.

SIGNALING CODE FOR AUTOS

Editor THE AUTOMOBILE:

[2,138]—Will you kindly tell me through "Letters Interesting, Answered and Discussed," what warning or signal I am supposed to give an automobile ahead of my car when I wish to pass such car on a public highway at night, when any body motions on my part cannot be seen by the person at the wheel of the car overtaken? It occurs to me that an established signal code blown on the horn, known to both to mean "I wish to pass you" would be practical and very useful to tourists. More than this, it would enable the overtaken car to give the allotted road to the passing car. Are there any fixed road signals to be used in such cases, and if so, what are they? READER. Buffalo Lake, Minn.

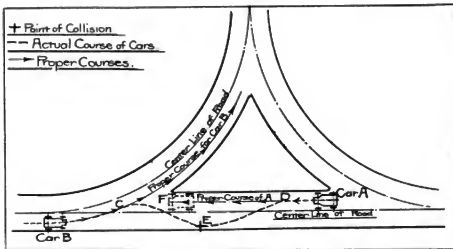
A long article was published on this subject in THE AUTOMOBILE, but as this was some time ago, part of it will be repeated. At present there is no accepted code of road signals, although the need is freely granted by tourists. A series of signals advocated in these columns is as follows:

Auto Signaling Code.

- | | |
|---|---|
| (1) When running ahead and going to make port, or to stop, | One long and one short blast of horn, to be sounded not less than 30 yards from stopping point. |
| (2) When coming to a standstill, or have made port, | One short blast. |
| (3) Going to start ahead, or leave port, | One short blast. |
| (4) When standing still and going to back up, | Two short blasts. |
| (5) Starting ahead slow on bad roads, slippery or muddy, | Three short blasts. |
| (6) Going to turn to left at road crossing, to be sounded before starting to turn, | Four short blasts. |
| (7) Going to turn to right at road crossing, | Two short and one long blast. |
| (8) In going a slower car on port side (left), | One long blast. |
| (9) In passing when abreast on port side, | One long and one short blast. |
| (10) When crossing intersecting roads, signal must be blown at least 20 yards distant from crossing, | Two long and two short blasts. |
| (11) Coming to forks of road, if any, cars, teams, vehicles coming in opposition use marine signal code; will turn to left; always keep on right side of roadway. | (Port) One long blast. |
| (12) Calling for assistance if stalled on the road, | (Starboard) Two long blasts. |
| | Five long blasts. |

We give the letter and code in full above, but would make the criticism that there are three pairs of signals, which are alike, and while it would appear that there is no danger of their conflicting with each other, it would be best to have different signals for the present duplicates. So we are suggesting changing three of the above as follows:

- (3) From one short to five short.
- (8) From one long to three long.
- (9) From one long and one short to one short and one long, a transposition.
- (11) From one long to three long or leave this as it is and change

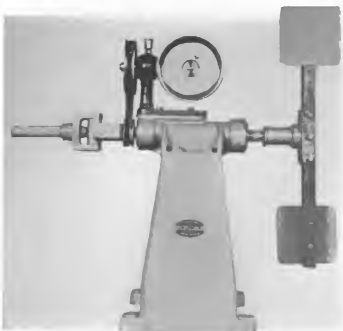


Sketch of Road Intersection Where Collision Described by N. W. L. Occurred

FAN-TYPE DYNAMOMETER FOR TESTING

The standard type of fan dynamometer shown in the accompanying photograph has been placed on the market by Joseph Tracy, consulting automobile engineer, 116 West Thirty-ninth street, New York. It consists essentially of a metal standard carrying a horizontal steel shaft in large ball bearings; one end of this shaft is connected to the motor under test by a universally jointed extension shaft, the other end carries an overhung two-bladed fan, as shown. On the dynamometer shaft a small pulley fitted to a boss on the rear of the universal joint is belted to a larger pulley on the special tachometer which is mounted on top of the housing that carries the dynamometer shaft.

The tachometer is provided with a double scale and single pointer, the inner scale showing the revolutions per minute and the outer scale the horsepower developed. The r.p.m. scale is graduated progressively by divisions of 20 revolutions from 200 to 2,000 revolutions. The horsepower scale gives a minimum reading of 1 horsepower at 480 revolutions and a maximum



New Dynamometer, the invention of Joseph Tracy

reading of 70 horsepower at 1,980 revolutions. Consequently at all ordinary rates of motor speed a simultaneous reading of r.p.m. and horsepower can be obtained without computation.

This dynamometer can be employed in testing motors on the block by making suitable connection between the jointed dynamometer shaft and the motor shaft, clutch or flywheel. It can also be used to test an automobile motor in position on the chassis by disconnecting the propeller shaft and substituting for it the jointed shaft of the dynamometer.

It is designed to test motors of medium-sized cars. However, by the use of fan blades of greater or less area and suitable tachometer scales, the range of absorption and measurement of power can be varied between wide limits.

Features of this apparatus which will commend itself to builders of motors, automobile manufacturers and others include simplicity, low first cost, compactness, durability and freedom from possible breakdown or interruption of tests; ease with which readings may be obtained by unskilled help; capacity for continuous tests for long periods without constant attention.

Modifications of the standard apparatus are built to conduct tests of power delivered to the driving wheels of automobiles, either shaft or chain driven. Patents have been applied for.

SOME NEWS FROM TIREVILLE

AKRON, O., Dec. 27.—The Akron Auto Garage Company, joined by the Akron Auto Supply Company, gave a successful automobile show here Friday and Saturday. The festivities took the form of a celebration for A. Auble, Jr., and Fred C. Wood, who are now the Oldsmobile-Oakland agents for the state of Ohio, with a large establishment in Cleveland, established there less than six months ago. Eight years ago Mr. Auble started in the automobile business in Wadsworth, and before that he was active in the bicycle trade, and appeared in many speed contests. He came to Akron, and a few years ago was joined by Mr. Wood. They began in a modest way, but made a big success out of the agency and garage business, and since they have organized the Oldsmobile-Oakland Company they have establishments in Cleveland and Toledo, as well as in Akron, and more than 60 men are in their employ throughout the state.

Local Elks are planning to carry a greeting from "Tireville" to "Autoville" when the Elks' national convention is held at Detroit next year. A steamer is to be chartered if present plans are worked out, and some sort of a souvenir is to be designed typifying the city's advanced position as a rubber center. The purpose is to bring Akron and Detroit into close juxtaposition on account of the former being the rubber tire center of the United States and Detroit being the auto center.

AUTOS FORGING AHEAD IN THE U. K.

LONDON, Dec. 20.—A recent census shows that during the past year a great increase has taken place in the number of motor vehicles registered in the United Kingdom. The classified totals are as follows:

	Motor Cars	Motor Cycles	Commercial Vehicles	Total
England and Wales	89,854	65,075	6,272	161,209
Scotland	7,521	5,321	421	13,263
Ireland	3,799	2,425	71	6,295
United Kingdom	101,189	72,821	6,765	181,755

The following figures show the increase in the number of motor cars and motor omnibuses in London during the past year:

	December, 1909	December, 1908	Increase
Motor cars	3,799	2,358	1,441
Motor buses	1,164	1,115	49

A. M. C. M. A. Handbook—The official handbook of the American Motor Car Manufacturers' Association, entitled "Leading American Cars," contains detailed specifications of all 1910 models made by members of the association. It also gives the names and addresses of all members of the association.

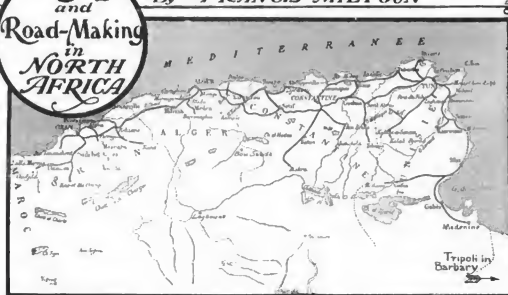
The models described have been arranged according to price classification, under the following heads: Cars up to \$1,000, \$1,000 to \$1,499, \$1,500 to \$1,999, \$2,000 to \$2,499, \$2,500 to \$2,999, \$3,000 to \$3,999 and \$4,000 and over. It is interesting to note that where 27 different models selling under \$1,000, 33 models between \$1,000 and \$1,499, 29 between \$1,500 and \$1,999, 12 between \$2,000 and \$2,499, 29 between \$2,500 and \$2,999, 24 between \$3,000 and \$3,999 and 29 at \$4,000 and over. The fact that there are 33 distinct models selling between \$1,000 and \$1,499 clearly shows that this is the most popular price.

In the commercial division there are 85 distinct models embracing all manner of vehicles. The prices range on commercial vehicles from \$500 as a minimum to \$6,000 as a maximum.

J. C. Coe, of Saskatchewan, dropped into Detroit recently, and by the time he had finished his errand had added nearly \$100,000 to the accounts of Detroit automobile manufacturers and agents. He was not an agent himself. He told his neighbors of the far Northwest that he was going east, and thirty of them gave him their orders to be executed in Detroit. Coe paid \$4,500 for his own machine and several of the others.

Roads and Road-Making in NORTH AFRICA

By... FRANCIS MILTOUN



BEFORE the conquest of Algeria by the French in 1830 there existed not a single kilometer of good road as it is known to-day, only by-paths, tracks and trails, where roamed the Bedouin and the Moor. It is a notable fact that to-day, scarce three-quarters of a century later, a great trunk line, a "Route Nationale" worthy to rank with the best of those in France, parallels the coast line from the Moroccan frontier to Tunis, and sundry other side roads practically duplicate it throughout, besides a half dozen important ramifications reaching down into the desert wastes of the Sahara.

Primarily the making of these routes was a military strategy, though almost immediately they became a necessity of trade, a developer of commerce. To-day they form almost the only *rescaw* of routes suitable for automobile traffic in an exotic land. The United States did her part in suppressing the Barbary pirates, but France has developed the African Mediterranean littoral in a commercial sense, and has made good roads grow where before were only camel-*pietes* and mule-tracks.

What is true of Algeria applies as well to Tunisia, though the French protectorate over that country began only a quarter of a century ago. Since that time, however, between three and four thousand kilometers of main roads have been built or relaid, and every body is happy and prosperous, though the Tunisian native is forbidden to emigrate, and the Bey himself may not *se mouvoir* without the permission of the French. France knew what Tunisia needed if the Bey didn't, and she proceeded to give it to the country. Result: commercial prosperity, good roads and a yearly increasing number of automobile tourists who are there seeking for new worlds to conquer.

Give a new country good roads and good railways and it is bound to prosper if there is

anything at all to it or back of it. Four millions of the total population of something less than five millions all told in Algeria, including also two hundred thousand Europeans, are almost entirely dependent upon the good roads of the country for their prosperity. The railway is still in embryo so far as efficient service is concerned, but the "good roads" have arrived. They are the rear arteries of the life blood of a country.

Joanne's "Algerie et Tunisie" and Michelin's "Guide d'Algerie et Tunisie," issued gratis to automobilists by the great tire house, are invaluable to the traveler. The one supplements the other immensely well, and smooths the way in many places that would otherwise seem rough. The maps in both these books are excellent. The "Carte Generale de l'Algerie," on a scale of 1:1,600,000 (which comprises Tunisia), is a large scale road map issued by the French *Dépot de la Guerre*, is interesting to study and have by one for reference (the



most is only one franc for the two sheets, and it may be had at the Touring Club de France), but certain modifications and new routes have in some instances been made since this map was originally issued, so it must not be trusted implicitly. Conty's "Touriste en Algerie" gives maps of most of the roads of the Sahel and the Mitidja, the Massif of the Petit Atlas and Kabylie and of the Djurdjura, and in addition gives them in profile, showing the elevations in a most practical and interesting manner, worth much to the unknowing tourist.

The Romans built the first roads in North Africa as they did in Gaul. They built them with the labor of soldiery, helped out with the compulsory labor of land owners and tenants, as the Roman



CÔTE de MEDEA



EL KANTARA

legions hereabouts, according to Momsen, never numbered over 27,000 men. The plan might work well to-day, in America, for instance, where good roads are needed badly, or in Britain, where an indolent soldiery are causing untold expense of up-

on the tax-paying public. Hitherto, in recent centuries, when local authorities have tried to build roads independent of a head supervising power, and have afterwards attempted to link them up with other short lengths, built by other self-willed beadies and bumbles, one and all have made a mess of it. This is fact and history combined. Road building is, or ought to be, considered a national work. The Romans knew and recognized this, and the French, and that is why Roman roads and French roads were and are "good roads."

The "Itinerary of Anthony" has much to say in its folios of the roads of North Africa, and states also that where stone roads did not exist the routes of communication, trails and *pistes* were surveyed and marked with *bornes milliaires* of the same species as those which radiated from the great golden milestone of Rome itself.

Besides roads the Romans built bridges (the two go side by side), and that's why the French Département des Ponts et Chaussées handles road-making and bridge-building to-day as did the Romans and Napoleon before them.

The bridge of El Kantara, between Batna and Biskra, is the outcome of a Roman work on the same site rebuilt by the unesthetic military geniuses of 1862 in an entirely clumsy manner, though for all that it still stands a massive monumental work, albeit it has entirely lost its aspect of antiquity.

The roads of Algeria are beautifully engineered. Route Nationale No. 1, at the Col de Ben Chicco, rises to a height of 1,220 meters, and the caravan route between Djelfa and Laghouat to 1,275 meters. Route No. 9, near Setif, too, rises over 1,100 meters. In spite of these elevations, all of them achieved from the lowest levels, and in comparatively short distances, the grades are seldom more than 5 per cent. (1 in 20). On route No. 3, practically at the entrance to Constantine, there is a bit of a climb of 20 per cent. (1 in 5), about all even a modern automobile can tackle comfortably.

The three following surveys indicate certain of the characteristic topographical features which one meets on a cross-country Algerian road.

ITINERARY NO. I

Towns	Altitude in meters	Kilometers
Alger	...	60
Biskra	...	90
Djelfa	629	177
Bouharj	629	177
Bouharj	629	177
Guelma	920	268
Cherchell	1150	303
Alm-el-Ibi	1040	368
Laghouat	795	442

ITINERARY NO. II

Towns	Altitude in meters	Kilometers
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12
Alger	...	12

ITINERARY NO. III

Biskra to Tougourt via the Caravan route, 204 kilometers	
Caravan pace	50 kilometers a day (4 days)
Horseback	32 hours
Dulgent	24 hours
Automobile	10 hours
Following the itinerary and schedule of the camel caravans the journey works out as follows:	
First day	81.6 kilometers to Cherga
Second day	82.8 kilometers to Mraier
Third day	44.6 kilometers to Gurlana
Fourth day	14.9 kilometers to Jouggourt
Hotel accommodation exists only at Mraier en route. At Cherga and Gurlana the herd or caravan offers shelter only. Food and drink must be carried	



IN THE GORGES OF PALESTRO



DESERT ROAD TO SIDI OKBA



OVER THE COL DE SFA

keep and returning very little. The procedure must have a centralized supervising power, as did that of the Romans, and county councils and petty hawliwicks, with cheap and nasty ideas of economy, should not be allowed to thrust their inefficiencies

The traffic conditions of Algeria are extraordinary. At a busy corner in Algiers 6,000 *colliers* (horses, mules and donkeys) pass per day, while on certain of the highroads in remote districts the number falls to 60 *colliers*. The average on the Routes Nationales of France is 185. Algeria, then, with its limited population has proportionately a far greater traffic by road even than France. This enormous going and coming by road in Algeria (and Tunisia as well) has necessitated "good roads," and as such the roads of North Africa exist to-day. And they are well kept amid great difficulties, for excessive dryness for the greater part of the year mitigates greatly against the easy upkeep of stone ballasted roads, the *routes empiriques* or the French system of good road classification.

In Algeria there are 3,000 kilometers of "Routes Nationales," 600 kilometers of "Routes Départementales," about 7,000 kilometers of "Chemins de Grande Communication" and another 2,000 of minor, but well-engineered and well-kept roads called "Chemins d'Interet Commune."

These roads, be it recalled, are nearly all of them lengths of modern roadway paralleling the coast. Crossroads are few, as yet, the tangents running to Bou Saâda, Biskra, Laghouat and Djelfa, being the chief of the "good roads" running across country, and the latter are only practicable for automobile traffic in their entirety under favorable conditions. The *pistes*, or caravan routes, are practically unsuited to wheeled traffic of any sort, and, of course, are not included in the figures given.

Adequate road signs are to a great extent lacking if one omits the governmental mile stones or "bornes kilométriques." In the vicinity of Algiers, and in certain other localities, the French Alpine Club has put up *poteaux indicateurs*, which render, even to automobilists, valuable services as far as they go. One of these is shown on one of the preceding pages.

From Blida ascending the wonderful Gorges de Cluiffa, beyond the Ruisseau des Singes, rises the Côte de Médéa. Médéa is one of the celebrated centers of wine growing in Algeria and its *crus* are of the first rank. For this reason a good road became an early necessity. The Côte de Médéa is on the main road from Alger to Laghouat and is the scene of the annual hill-climb of the Automobile Club d'Algerie. It is a 6 to 10 per cent. steady rise for the most part. It rises up the mountain side in those picturesque hair-pin lacets which one usually only associates with Switzer-



AN OUTPOST HOTEL at FIGUIG

land or Dauphny or Savoy in France, where the roads are even more wonderfully engineered and graded than those of Switzerland, great as the latter may be or actually are.

The main road leading out from Algiers is most interesting throughout, as here and there it cleaves the plain, tunnels through a rock wall and finally climbs up to a bare, dreary height and passes through a gateway known as the Portes de Fer. It is a tangible monument to the prosperity of the neighboring country which has developed as a result of the accomplishment of this great Route Nationale.

The mountain road through Kabylie is in quite a different category, though it serves the region well enough. This road on the main is simply a strategic highroad conceived by the military authorities as a thing to be valued for the future rather than for the present alone. The mountain region of Kabylie is about the wildest through which it is possible to pass an automobile to-



ROAD THROUGH DJIDJELLI

day, though before March it is no unusual thing for it to be snowed up for days and days.

The direct road via Meuseville and Salestro is practicable throughout the Winter, though at its greatest height, even here in semi-tropical Africa, a meter or more of snow has been known to lie on the road for days, and only last season the railway itself was snow-bound for twelve hours or more. And this is Africa!

From Bougie there is a remarkably picturesque road traced through via Djidjelli and Zeraia to Constantine, 257 kilometers. It is a "corniche" road beside the sea for nearly 100 kilometers, and from many points of view, principally that of a savage wild environment, it is the peer of that more famous "corniche" between Nice and Monte Carlo, where auto scorchers and racing electric trams have made one of the most beautiful strips of coastline in the world extremely dangerous and hideous. This road via Djidjelli is reckoned by the government authorities as a "route empierrée, en bon état." A daily diligence covers the same road, and all the difficulties encountered can be summed up in the few words which describe the lacets and twistings and turnings as dangerous at high speeds. Otherwise the roadway is superb.

From Setif to Constantine, "la ville Stéienne" of the ancients, which most of us have hitherto known only by the contemplation of Vernet's picture of its famous siege now in the gallery at Versailles, is but 127 kilometers, the road rising and falling continually, and then shooting up into the air on a 20 per cent. flight just as Constantine is reached.

The road out from Constantine to Philippeville and Bone, over the Col des Oliviers, is interesting and sufficiently dangerous in some of its rises and falls to be exciting. It is, in fact, a remarkably good piece of road building, and on it even a low-powered automobile can beat the railway between the two points every time.

From Constantine to Batna via Kronbs is 119 kilometers of quite the best long stretch of roadway to be found in North Africa. Batna is hotter than blazes in Summer and about as cold as Greenland in Winter. This is caused by the fact that it sits on a high plateau. Between seasons it is delightful as to climate.

Out from Batna on a round of 80 kilometers of dreary sun-



baked, but well-built roadway lie those wonderful buried cities of the Roman occupation of the past—Timgad and Lambèse. There is nothing so grand yet discovered above or below ground, excepting Pompeii.

There is a string of these buried Roman cities running south-westerly from Tunis and they, as well as the roads connecting them, were built by Roman soldiery, with the assistance of such native labor as was available. To-day the excavations at Lambèse are being carried on with the labor of the prisoners of the great penitentiary nearby who also have been put to work on the roads, not at mere stone breaking or oakum picking, or left in solitary confinement. Here's an idea for using a vastly increasing supply of manual labor, of which there is a superabundance.

To El Kantara from Batna is 87 kilometers, the road of the plain now climbing the foothills of the Aurès until it finally culminates at the rock-wall, known as the Gorge of El Kantara, literally the curtain which shuts off the desert from the sown. The pass through the gorge, the old Roman road crossing the now dismantled bridge, the modern road and the railway as well form a wonderfully picturesque and practicable combination. The route from El Kantara plunges down a 50-kilometer descent via the Col de Sfa to the edge of the desert at Biskra.

Though the road here ranks as a Route Nationale, it degenerates into a vague undefined track over the Col de Sfa. It takes up with its old form again later on. There are 10,000 camels passing this way to a hundred wheeled carriages and one automobile. When the reverse is the case—or before—the Col de Sfa will doubtless be leveled off a bit and the rough places smoothed out. At present the Col de Sfa in Algeria is a little brother to the mountain road up Mont Ventoux in Provence, a 22-kilometer hill climb up a finely graded road with a very loose surface. The Saharan track would be more nearly suited to the automobile were it not for these soft patches of sifting sand.



THREE KINDS

OF TRANSPORT

IN ALGERIA

In ten hours from Biskra, if all goes well, an automobile will be at Touggourt, in the very midst of the sandy ocean of the Sahara, where the Hotel de l'Oasis will be found not bad. Garage accommodation, as such, is, of course, non est, and supplies of essence and oil for the return journey will have to be carried or sent down from Biskra, the *bidons* (the regular two-gallon tins of the petroleum trade) slung together across the hump of a camel.

En route for Tunis the road doubles back from Biskra, 226 kilometers, to Kroubs, and to Bone another 180 kilometers.

From now on the road to the Tunisian frontier lies via La Calle and Tabarka, and is a long way from being a bee line; in fact, it is well-nigh 200 kilometers out of plumb. Via Souk-Ahras and Le Kef, from Kroubs, there is only a "*piste corrossable*," unsuitable enough for automobile traffic to-day except at the expense of pneumatics and "*la mecanique*."

There are no topographical difficulties to be encountered on these roads of the Constantinois, the eastern province of Algeria, and they are rather more highly developed than those of Western Algeria. Habitations hereabouts are infrequent, however, and a leaky radiator, pump or petrol tank might possibly mean that an automobilist would be uncomfortably stalled if precautions were not taken beforehand.

From Bone to Tunis is nearly 300 kilometers, and, take it all in all, the itinerary is as varied a one as will be found in all North Africa, the road surface being entitled to rank as "very good," with perhaps bad spots here and there.

The roads of Tunisia are also of the same class as those of Algeria and are ranked "very good." Of this class there was in 1907 5,000 kilometers (practically all trunk lines) already open, with 200 kilometers more in the making, and still other great projects all looking to the developing of the *Sud-Tunisie*.

The roads in the environs of Tunis are almost invariably excellent. Particularly is this true of those running from Carthage and its three superimposed buried cities to Bizerte and its modern arsenal; from Nabeul and its potters to Khorbus and its baths, and from La Marsa to the great dam at Zaghouan.

Teboursouk and Dougga and their Roman remains are only a hundred kilometers away over a trunk line road, and Kairouan, the Holy Musulman city of Tunisia, with its open door mosques (all others in the country being shut against dogs of infidels) but 155 kilometers, and all of it over good surfaces.

Beyond, still towards the South and the great desert, are Sousse and Monastir, the quaintest of Mediterranean ports, and the great amphitheater of El Djem, one of the most astonishingly placed Roman monuments one ever came across, sitting close beside the modern Route Nationale the descendant of an ancient

road, built here at a period contemporary with the great Roman arena. Southward another 60 odd kilometers is Sfax. From Sousse to Sfax is a great gap not yet bridged by railway. The service is kept up by automobile omnibuses. This speaks well for the roads of Tunisia, that the automobile can go where the railway has not attempted to stretch forth its streaks of iron rust.

From Sfax to Gafsa runs a cheap sort of railway, mostly used to transport phosphate from the mines, but carrying passengers as well, with considerable difficulty—to the passengers.

This automobile service between Sousse and Sfax runs in competition with the conventional stage-coach of old, the French diligence in fact, except that it is hitched up behind six mules and presided over by one swarthy Arab to hold the lines and another to do the lashing out with a rawhide, and the swearing.

The prices for the various kinds of accommodation offered are as follows. If any far Western stage company thinks of installing a similar service the figures as to what is being done here may be of some service.

First class, in automobile, 128 kilometers, 25 francs.

First class, in diligence, 128 kilometers, 12 francs.

Second class, in diligence (on the roof), 128 kilometers, 8 francs.

The automobile takes six hours en route and the diligence fourteen. Time is money, even in Algeria!

As far as Gabès, 405 kilometers from Tunis, the road still holds good, and to Medenine, another 75 kilometers, it is practicable, though leaving much to be desired here and there as to surface which is apt to be overblown with soft shifting sand.

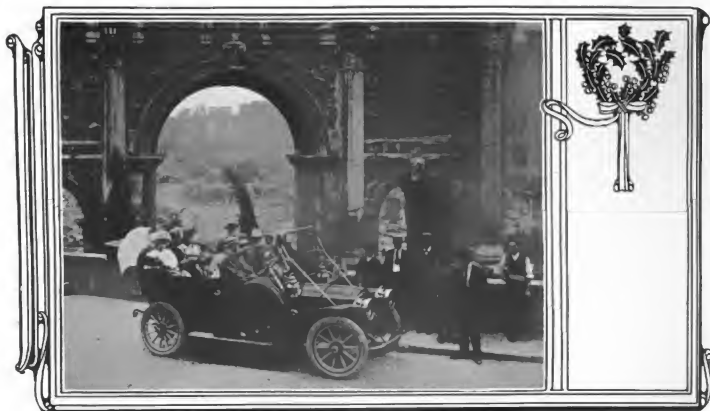
Beyond Medenine, not far away now, is the frontier of Tripoli in Barbary, under the dominion of the Sultan of Turkey. Automobiles are not in favor in the realms of the Sultan, nor are there as yet roads suitable therefor, so unless one is prepared to continue their route by aeroplane this must end the automobilist's North African itinerary.

To Theater by Aeroplane—According to the English *Automotor Journal*, the management of Her Majesty's Theater, Carlisle, has placed on its programs the announcement that for the convenience of patrons coming from a distance aeroplanes can be stored free of charge.

There will be no motor car exhibition in Berlin next year, as at the general meeting of the German manufacturers and traders the motion to resume show promotion, which has been interrupted since November, 1907, was defeated.



Pierce-Arrow Car, Owned by William Bausch, with Which He Won a Rochester, N. Y., Floral Parade



Arch of Septimius Severus, Rome, with Palatine Hill on Right, and Packard with Boston Automobilists in Foreground

MANY AMERICANS ABROAD THESE DAYS

PARIS, Dec. 24.—When France proposed to impose a tax on automobilists from abroad who use her fine highways she evidently did not realize that these same automobilists this year left behind them a train of gold representing, on a moderate estimate, not less than \$7,200,000. "The Packard Motor Car Company alone," declared H. D. Wilson, their Paris agent, to **THE AUTOMOBILE** representative, "is responsible for turning \$450,800 into the hands of French hotelkeepers and others. This year 250 of our cars have passed through France. They carry, on an average, six persons and remain one month. Each person spends on necessities—ignoring such luxuries as works of art, curios, etc.—the sum of \$10 a day; thus a little calculation shows the correctness of the total sum of \$450,800."

But the Packard company is not the only one sending cars to Europe for touring purposes. Figures supplied by the Royal Automobile Club of Great Britain, the Touring Club of France, the Automobile Association of Great Britain, and the Association Generale Automobile, show that 2,000 triptyques have been issued to American and English automobilists this year. This, however, by no means completes the number having entered France with foreign cars, for many owners pay the customs deposit instead of taking out a triptyque; others come over with European cars on which there is no duty to be deposited; a certain number of rich Americans maintain an automobile in France and use it only on their annual trips to this country. A still larger number prefer to hire an automobile from one of the many agencies established for that purpose in Paris.

On a moderate estimate the triptyques only represent 50 per cent. of the automobiles employed by Americans and English for touring through France. The total number is certainly not less than 4,000 for the present year. The American automobilist rarely remains less than six weeks; his English cousin is content with a much shorter period, but the average stay can be taken as a month. Estimating six persons in each car, a stay of one month, and an expenditure per person of \$10 per day, the amount of money left behind is \$7,200,000. The automobile is directly responsible for this entire sum, for no account is

taken of the hundreds of Americans who tour in the ordinary way, nor of the sums the automobilists spend on objects having no connection with touring and every-day living expenses.

The most remarkable feature of the European touring move-



Packard Tourists Opposite the Ancient Roman Forum



The Harbor Front at San Remo—Tourists Enjoying the Delightful Climate and Picturesque Features of Southern France

ment is the number of American-built cars that are annually brought over. Packard seems to be at the head of the list with its 250 for the present year. This only represents the number of cars that have been reported. A certain number of owners,

having no need for spares or for touring information, arrive and return without the Paris office being aware of their presence. In addition to the complete stock of parts and the up-to-date touring information, the Paris branch now maintains a mechanic, sent direct from the factory at Detroit, and on duty during the season.

N. S. Goodsell, the Pierce-Arrow Motor Car Company's European representative, reports 112 cars during the first nine months of this year, and estimates that the total will be 125 to the end of December. Nearly all the cars are six-cylinder models, of 1909 production, and carry an average of five passengers. Last year there were a few bad smashes, due to inexperienced handling. During the present season the sale of spare parts has been confined to brake liners which give out on the long mountain descents with their perfect surfaces, unknown in America. Though not established for selling, the missionary work done by the visiting automobiles is so effective that the Pierce agent will be obliged to obtain an option on a certain number of cars next year.

Peerless is the third firm having a Paris spare parts and information bureau. M. Bousquet reports that the number of automobiles already reported and expected during the coming portion of the year will be from 70 to 80. These three are not the only American firms represented by tourists in Europe this season. The others, however, do not maintain offices on this side, nor are their cars seen very frequently. Among those that the writer has come across are White steamers, Locomobile, Thomas, Ranier, Maxwell, Welch, Ford, Mitchell and quite a number of other representative American makes.

The recent international agreement on the acceptance of driving licenses in countries other than of issue will doubtless have a stimulating effect on automobile touring during the coming season. Many would-be tourists have refrained from bringing over their cars on account of reports of the red tape involved in securing the necessary permits. In many cases these difficulties were exaggerated, it is true, but no one could find fault with the present regulations. A single examination, which may conveniently be taken in either France or Germany, will admit to every Continental country the tourist is likely to visit.



At Rear of Palace of Justice, Rome—Cavour's Statue

How Jacob's Ladder Became Climbable

By Cortlandt Field Mabey

THE extreme western part of Massachusetts consists of the region known as the Berkshire Hills. These, roughly speaking, extend north and south between the Connecticut river and the New York State line. In other words, this region comprises the broad upper valley of the Housatonic river and the mountains to the east thereof, forming the watershed between the two rivers just named. This district is hilly in character and sparsely settled, its population being far less than formerly when the now-abandoned farms were occupied.

To the east, this region is drained by the numerous branches of the Westfield river, which empties into the Connecticut not far from the city of Springfield. The route that has been adopted for the main trunkline of State highway across the commonwealth of Massachusetts, from the city of Boston toward Albany, ascends the valley of this river from Westfield, closely following the railway. At the town of Chester, some twenty-nine miles from Springfield, this highway leaves the railway and gradually ascends westward following the windings of Walker brook. Up to this point the grades have been slight and the roadway nearly all of macadam.

For thirty-three miles from Springfield there was practically no choice of routes for the tourist who wished to visit the Berkshires in his automobile. But from the crossroads known as Bonny Rigg Corners, there were two roads. The one to the north rejoins the railway at Becket Station and proceeds to Pittsfield up and down a series of short hills over wretched roads with bad surfaces. The other alternative was to proceed due west, surmount the watershed by a long steep ascent and descend less rapidly, but without crossing intermediate ridges to the Housatonic river at Lee, whence several years ago a splendid highway was built to Pittsfield. It is the last route which bears the name "Jacob's Ladder," and it is doubtful whether there is any stretch of road in the New England States which has caused more trouble to automobiles and their owners.

Starting from Bonny Rigg Four Corners, the ascent rapidly became greater, the road surface poorer and poorer, until, as one emerged from a wooded tract, there appeared right ahead an almost perpendicular stretch which seemed to reach to the heavens. Some years ago there was at the base of the "Ladder" itself a spot on which for many years, before the advent of

the automobile, the road-makers had utilized as material for repairs the re-use sawdust from an old mill. This place was known far and wide as "Sawdust Hole," and few were the automobiles that could get through it. When dry it was hard enough, but the intelligent farmers in the region discovered that sawdust mixed with a little water would stop any automobile, no matter what its power. Consequently, they made a practice of adding a little sawdust whenever rain fell and water when it did not. As a result, the autoists, after vain efforts to extricate their cars, were forced to go back to the nearest house for horses, and the regular schedule price for their use was based upon the horsepower of the stranded car. "Sawdust Hole" was put out of business five or six years ago as a result of the expenditure of a fund raised by some of the automobile owners of Lenox.

But "Jacob's Ladder" remained, and it was not till October, 1909, that the old road over the crest of the watershed was abandoned. The writer has been familiar with "Jacob's Ladder," or Morey Hill as it used to be called, for more than twenty years, and he can well imagine with what feelings the autoist who had emerged from his struggles with "Sawdust Hole" beheld it for the first time reaching far up above him. The road surface was never good—it was always rough and narrow, and there were two or three spring holes near the top which were fatal in wet weather. The farmer in the nearest house kept his horses ready, and few were the automobilists who did not contribute to his daily income. In some spots the grade amounted to nearly 20 per cent.

All is now changed. "Jacob's Ladder" is a thing of the past, and as a result of a campaign which has been carried on vigorously for five or six years, the watershed between the Housatonic and Connecticut valleys is crossed by a wide, well-built macadam road, whose grade nowhere reaches 7 per cent. It has required the combined and persistent efforts of many persons and many interests, but in the Winter of 1908 a special appropriation of \$50,000 was secured from the Massachusetts Legislature for the improvement of this stretch of highway.

The most important part of the work done under this appropriation begins at the foot of the final ascent, and at a point one mile west of "Sawdust Hole" the new road leaves the old



Jacob's Ladder as it Once Was



Road In Process of Construction

location and curves off to the left in a wide sweep, and reaches the watershed at a point a quarter of a mile south of the former summit and nearly two hundred feet lower. It then bends to the northwest and descends with a gradient of about 6 per cent., rejoining the old road at the foot of the hill, the total length of the new layout being about 6,800 feet.

In addition to this "Jacob's Ladder" proper, a strip of two miles of macadam, covering the former "Sawdust Hole" and the approaches from the east, was built under this appropriation, and it was opened to travel in October of this year. Not only

the road itself is of a permanent character, but bridges and culverts of armored concrete have been built, and concrete parapets and wooden guard rails provided where necessary.

In 1909, a sum of \$25,000 was secured for the purpose of improving the highway from "Jacob's Ladder" westward toward the town of Lee. With this money, a stretch of four miles of bad and narrow road has been entirely rebuilt, drained, and graded. In several places the road has been relocated and steep pitches avoided or reduced. Substantial concrete bridges have been built, but no macadam laid. The narrow road along the north shore of Greenwater pond has been widened and raised above the highwater mark.

As a result of the work of these last two years, there remain only a few miles of unimproved road in this main trunkline of highway which extends across the commonwealth of Massachusetts from Boston to the New York State line, there to join the main road which will soon run through to Buffalo. There remain about two miles in the eastern part of the township of Chester and about five miles in the towns of Becket and Lee which are still unimproved. It is to be hoped that the combined influence of those who own automobiles in Massachusetts, and allied interests, will be brought to bear upon their representatives in the Legislature in order that at the session which opens on January 1, sufficient money may be appropriated to complete the work so well done in 1908 and 1909. No finer ride may be

imagined than that which is now accessible from Springfield to Pittsfield across the once dreaded "Jacob's Ladder."

ON GOOD ROADS

From the report of the Committee on Good Roads at the Annual meeting of the Carriage Builders' National Association, at Washington, D. C., the following interesting excerpts are taken:

"Better roads are one of the pressing needs of the United States. In the innumerable things that have had to be done to put the country in the commercial, industrial and social position it has achieved in such a marvelously short time, road building until very recently has largely been overlooked, and the important place occupied by highways in the expansion of a nation might not even yet have been so generally recognized if it had not been for the advent of the bicycle and the automobile.

"Within the last decade not only the drivers of vehicles have come to want good roads, but the people and the interests which will financially profit by them have awakened to what they are losing by poor highways.

"When the means of communication are bad, people are disinclined to venture far from home, and social and business relations are narrower in the country districts. Many a farmer curtails his crop simply because he has no way to market them.

"The railroads have come to realize that they are losing hauls that they might have if the agricultural districts remote from the large cities had good roads over which to get their produce to the cars.

"Some of the railroads of Virginia, for example, have taken hold of the question in a practical way. Virginia is entering upon an era of road building; to help open the State, as it were, certain railroads have made a proposition to carry all material for road building at cost, and all laborers and machinery intended for the work free. Much will be saved in this manner that can be devoted to road building, and the railroads will reap a return in increased freight traffic."



Completed Road Around the Ladder.



Cortland Field Bishop on the Ladder's Top, 1909



Mr. Bishop Stuck on Jacob's Ladder in 1908



De Lessepe's Monoplane of Original Design in the Shop of the Societe de Construction d'Appareils Aeriens

FRENCH AVIATORS DEVELOP NEW POSSIBILITIES

PARIS, Dec. 24—Count de Lesseps, son of the French engineer who dug the Suez Canal, has set up a new record for the Issy-les-Moulineaux ground and the Blériot cross-Channel type of aeroplane. After a short apprenticeship, the aviator succeeded in remaining aloft 1 hour and 30 minutes. Although all the early flights were made on the Issy ground, no aviator has attempted to make an endurance flight at this place. The performance is also a record for this type of machine, the previous longest flight being performed by M. Blériot, and not exceeding 45 minutes.

In his intervals of teaching Lee Guinness, the British millionaire brewer, famed for his ownership of the Darracq eight-cylinder record-breaking automobile, Hubert Latham is flying over the Mourmelon plain with various loads on his Antoinette. His latest exploit is to carry a cinematograph operator together with all his equipment. The flight, which was of about eight minutes' duration, was made at a height of fifty feet, the operator turning the film through the machine all the time while in the air. The supplementary weight was about 250 pounds, of which the operator was responsible for 140. This is the first time moving pictures have been taken from a flying machine, but not the first time photographs have been obtained. When Latham attempted to cross the English Channel last Summer he had a kodak fitted up in the bow of his aeroplane. Exposures were made with it, but owing to landing in the water everything was destroyed.

Louis Paulhan, who, after considerable hesitation, has decided to desert his native land for a few months in America, has just completed his apprenticeship on a Blériot monoplane. He can now fly on three different kinds of aeroplanes: Voisin and Farman biplanes, and the Blériot monoplane. The first two mentioned are so

similar that a man who has mastered one ought to be at home on the other. The Blériot, however, is of such a different type that it is surprising Paulhan should have been able to fly with it on the first attempt. The French pilot appears to have been afraid of legal trouble with the Wright Company if he came to America, and in order to prevent the seizing of his machine he has removed the ailerons from the Farman and the wing-warping mechanism from the Blériot. The Voisin did not need changing, for the Wrights have never claimed that it infringed.

SMALL SANTOS MACHINE IS POPULAR

PARIS, Dec. 23—Since Santos-Dumont met with success in flying his "Demoiselle" aeroplane there have been a number of persons who have endeavored to construct a similar machine on the model offered to the public by the young Brazilian. The latest and most interesting of these copies is one produced by M. Nieuport, of magneto fame, who although following the general Santos-Dumont design, has introduced a number of interesting improvements. Instead of placing the seat entirely below the wings, Nieuport has built a kind of cockpit in the centre, the base of it being partly below the wing surface and the upper portion only slightly projecting. The tubular radiator, instead of being placed under the wings, as on the original "Demoiselle," is carried on each side of the cockpit.

The motor, the new two-cylinder opposed built by Darracq, is placed in front of the pilot and slightly below the front edge of the wings. It drives a two-bladed wooden propeller built by Chauvière. Instead of bamboo, steel tubing is used almost entirely for the framework of the machine. Starting is made on two



Jacques de Lesseps, in Costume

pneumatic tired wheels set very far apart, while landing is performed on skids. Hayden Sands, the first American to learn to fly an Antoinette aeroplane, left Paris this week for Egypt in order to give flying exhibitions. Mr. Sands will take part in the meeting at Heliopolis, near Cairo, next February, and later will visit India and continue a trip around the world. The machine which he will employ is the one with which Latham, his instructor, made his record height flight and flew across country in order to keep an appointment with Marquis de Polignac.

Arthur Duray, who has figured in all European automobile races, and drove for De Dietrich in some of the Vanderbilt events, is now taking lessons on a Farman biplane and intends to compete in the Egyptian aero meet next February.

WRIGHTS TO USE DAYTON AUTO FACTORY

DAYTON, O., Dec. 27.—The recently incorporated million-dollar Wright Company, which is supported by such financiers as Cornelius Vanderbilt, August Belmont, Howard Gould, Robert J. Collier, Andrew Freedman, Morton S. Plant, E. J. Berwin, T. P. Shonts, Allan A. Ryan and Russell A. Alger, will build its aeroplanes in the factory of the Speedwell Motor Car Company, in this city. The Speedwell Company is not sacrificing any of its present manufacturing space for the aeronautical work, but is adding a new building of 8,700 square feet for the use of the Wrights. This building will be ready for occupancy some time in January, and will have a capacity of about four machines a week. It is stated that the company has already 175 orders, and they continue to come in so rapidly that manufacturing must be pushed at utmost speed to catch up.

DETROIT WILL PRODUCE 60 PER CENT. OF ALL CARS MADE

By LEN G. SHAW

DETROIT, Dec. 28.—Now that the official statisticians have busied themselves with pencil and paper and solemnly aver that the year 1910 will witness the production of approximately 200,000 motor cars, it is interesting to note what part the hub of the automobile industry is planning on playing in these proceedings, and what it will probably accomplish.

There are twenty-four full-fledged automobile companies in Detroit, in addition to which are several who have not yet cast aside their swaddling clothes. Five of these concerns will write their output of cars in five figures, and at least four others will reach the five thousand mark or better before the end of a season that is already well on its way. All the others will produce automobiles at a rate that, now considered very commonplace, two years ago would have placed them among the leaders.

Forecasting a season's output and living up to the forecast are two vastly different things, as many a factory manager can testify to his sorrow. This statement is particularly applicable at a time like the present, when difficulty in securing parts and even raw materials is a factor that must be reckoned with. According to factory managers, who speak advisedly, and whose determination is to live up to their predictions, Detroit will during the present season give the country no less than 120,000 automobiles. That means that if their expectations are realized this city will produce sixty per cent. of all the cars it is figured will be made in the United States this season. But the best laid plans of factory managers, like those of mice and mere men, oft go wrong.

If the marvelous building operations now in progress are concluded in time, and if parts and raw materials can be secured in the desired quantities, and if skilled labor is always available, and if there are no delays in the matter of transportation facilities, and if the sales departments busy themselves sufficiently, there is no reason why Detroit's automobile factories should not produce the number of cars now being planned. However, on those "ifs" hinges much, and those in close touch with the situa-



Framework of Bertrand Monoplane with Cylindrical Body

LOS ANGELES MEET MAY BE ADJUSTED

At the meeting of the Aero Club of America to be held Thursday the final decision will be made concerning the sanction for the aeronautical meet of the Los Angeles Aero Club. The national body objects to the conditions for the prizes offered, saying that \$20,000 of the prize money cannot possibly be won. There is an offer of \$10,000 for a dirigible flight from Los Angeles to San Francisco, and another \$10,000 for a balloon trip to the Atlantic, both feats regarded as physical impossibilities. President Bishop, however, believes that the matter can be adjusted and the sanction granted.

tion, and accustomed to discounting such matters, agree that if local makers produce 100,000 cars they will be going some. Even if that figure is not reached, and the output drops to 90,000, a point that is regarded as very conservative, there will be no occasion to be ashamed of the showing, as that will still be 8,000 in excess of the actual output of cars in the entire country in 1909.

First and foremost, of course, in the matter of numbers come the E-M-F interests, who, seeing a favorable disposition of their disagreement with the Studebaker Automobile Company, are laying plans to build 25,000 Flanders Twenties and 15,000 E-M-F Thirties. Close behind comes the Ford, with 21,745, others who require five figures to tell the tale being the Cadillac and the Brush, with 10,000 each to their credit in the forecast. The Hupmobile proposes building 7,500; Chalmers-Detroit, 5,200; Hudson, 5,000; Regal, 5,500; Packard, 3,000; Everett Thirties, 2,500; Demot, 3,000; Krit, 1,000; Abbott, 1,000; Warren, 1,000; Owen, 500; Welch-Detroit, 500; Detroit-Dearborn, 500; Herreshoff, 1,500; Detroit electric, 1,500; Anhut, 750; Paige-Detroit, 3,000; Van Dyke, 3,000; Grabowsky, 300.

Of course, many of these figures are predictions, founded on good faith, but entirely dependent upon conditions that may arise. The older concerns will all be able to make good, in spite of the great increase over that of last season. They have been through the mill. Some of the younger ones will experience difficulty in living up to expectations that would terrify those older in the game. Nevertheless, it is absolutely certain that if the aggregate output of the country is 200,000 automobiles, Detroit will come very near to producing fifty per cent. of these, if, indeed, it does not furnish the majority, this assertion being made after liberally discounting the plans of all local makers save those who are in a position to absolutely live up to predictions. At all events, the man who wants a Detroit built car need experience little uneasiness through fear that his wish cannot be gratified, provided, of course, he has the purchase price.



PARIS, Dec. 20.—Sport of all kinds demands special costumes if one would be well and comfortably clothed. Just as the automobile brought about, at first, leather and then fur clothing, those who go up into the air in balloons and aeroplanes have found that something especially warm and wind and chill resisting is required.

The designs herewith are no phantasies; each has been tried recently by French aeronauts and not found wanting, though perhaps susceptible

of some modification. Certainly they are not graceful nor even becoming, but one thinks they are quite suitable to voyaging through first a strata of half-frozen cloud, then a sheet of rain and finally a band of crisp, zero atmosphere or less, and all these things are the aeronaut's destiny once he rises up from Mother Earth.

The particular costume herewith was of impermeable camel's hair like the waterproof "loden" of the mountaineer. It is extremely light, fairly supple and graciously warm, each and all desirable qualities. The garments are so made that with a cap, or *casque*, for the head two pieces cover one from forehead to feet, including the hands and even the feet; thus preventing currents of air from circling around the ankles. The automobilist himself would appreciate this.

Another material recently tried, lighter even than the foregoing, is paper. As M. Maire, the librarian of the Sorbonne, puts it, the Japanese have long known the use and value of paper for articles of clothing, while we ignore the fact that a penny paper quadrupled and laid across the chest has many times the value, as a heat preservative, of the best woolen tricotee ever knitted by hand or machine.

It is up to the aeronauts and aviators to popularize vests and plastrons of paper, and then, when we can buy them anywhere along the road, will spring up a new and important traffic in the product and industry which will bring millions to somebody.

Another aviator's costume has just been launched on the market, made of *Kapok* or the *duvet* of Java, a species of vegetable fiber, a poor grade of cotton perhaps, which, in the form of a lightly padded suit, is at once light, warm and waterproof.

M. Painlevé, member of the Institute of France, who accompanied Wilbur Wright in his prize-winning flight at Le Mans recently, when he gained half a million francs, stated that in little more than an hour he was nearly frozen stiff. What he meant, perhaps, was that he was cramped, but a combination of inactivity and being continually in a stiff breeze without the least shelter gave a sense of freezing because of lack of circulation. This would have been greatly allayed had some species of wind- and cold-resisting clothing been adopted, and so comes the special tailor for aeronauts. Fifth avenue tailors, get busy!

From Buffalo, N. Y., comes a report that Dr. Charles Meyers made a three-quarter mile flight in a machine of his own construction at a height of 10 feet. The trial was not public.

THE DIARY OF AN UP-TO-DATE MAN

INDIANAPOLIS, Dec. 27.—Some people think it costs a lot of money to be thoroughly well groomed and up-to-date, but Charles Pinkham Jones keeps a diary that includes an expense account with a glimpse of which your correspondent was favored the other day, and from it he is able to give exact figures as to what it costs a bachelor, who uses modern labor-saving appliances instead of a valet, to present himself every morning at the bank, the perfect pattern of a well-groomed man. Here is the record for an average morning:

	Electric current K. W. hours.
Rose at 7 o'clock and took an electric bath, for which	
the current used was.....	.3333
Heated bedroom for ½ hour with electric stove.....	.5000
Heated water for shaving on electric stove.....	.3333
Used electric boot cleaner.....	.0123
Pressed trousers with electric iron.....	.0400
Ironed silk hat with electric ironer.....	.0333
Kneaded dough for a loaf of bread with electric	
kneader.....	.0066
Boiled a pint of coffee on electric stove.....	.0666
Cooked a chop by electricity.....	.0066
Aired my room with electric fan.....	.0258
Turned on electric piano while I ate my breakfast.....	.0500
Cleaned the knives and forks with electric cleaner.....	.0010
Polished the plates with electric polisher.....	.0050
Curled my moustache with electric curling iron.....	.0025
Lighted a cigar with electric lighter.....	.0002
Rode in electric elevator to the basement.....	.0023
Drove my Waverley Electric 4½ miles to the bank.....	1.0000
Total kilowatt-hours.....	3.1788

for which I pay 10 cents per hour or 22 cents in all. This does not take account of the current used in my electric clock, but as a single K. W. hour will keep that running for ten years it seems safe to disregard the clock.

After this who will question the economy of electric power?

For the information of any reader who does not understand the term we will add that the kilowatt hour is the unit of measuring electric current charged for by the lighting company. It means the use of a thousand watts of electricity, or the equivalent of one and one-third horsepower, for one hour.

LOUISVILLE WILL HAVE BOULEVARD

LOUISVILLE, Ky., Dec. 27.—Louisville is to have a boulevard which will encircle the entire city. It will be constructed in such a manner as to connect all the parks beginning at Cherokee park, and taking in Ingoquois and Shawnee parks, thence running northward along the river front to Portland and back over the city streets to the Highlands and Cherokee park. The estimated cost of the boulevard will be \$180,000. Part of the right of way has already been secured, and, it is believed, there will be little difficulty in securing the remainder. The boulevard has been considered at great length in the past but owing to the cost it has been laid over from time to time. The Louisville Automobile Club have taken the matter up and will push the project until the work is finished.



Pioneer Autolal, Now a Londoner, Sends Greeting

How I Made My Car Pay For Itself

By Ernest Edmunds

THE discussion of a subject of this nature marks a radical departure in the development of automobile literature. Seldom has an automobile been deemed an asset except when in the possession of the trustee of the bankrupt's estate reduced to cash in readiness for division between the owner's creditors; rather has it been regarded as a distinct liability. A man buys a house to stop paying rent to the other fellow; he buys an automobile and his payments to the other fellow are just beginning. Hence, it is obvious that in a dollar-discussion of the automobile the question must turn upon the profits of the machine as figured not only in money but in health preserved and in pleasures gained.

But the improvement in the mechanism of automobiles, coupled with the marked movement of middle-class Americans to utilize the car as a means of concentrating the expense of their family pleasures, forces a consideration of the subject in this latter-day light.

The nature of this article forces as well as excuses a few personal remarks. I am a lawyer and the owner of a Maxwell runabout of the 1909 design. If I magnify the importance of the assembled mechanism by referring to it as an automobile in the feminine gender, "she" has not paid for herself; but if I call it a machine and consider it in the neuter, "it" has paid for itself. I am going to consider it in the latter gender because my knowledge of the expense of the feminine gender is confined to bringing suits in which the wife never was to blame and the husband always named as the defendant. Nor is there a possibility of that knowledge being increased in view of the fact that a runabout will not carry a chauffeur; and, unlike the two-horsed rig of the rural swains, it takes both arms "to steer the thing." One commercial advantage of the runabout is that there is no place to seat a chaperon unless you go to the expense of putting an additional seat on the tool box. Hence I am going to tell you how my machine has "paid for itself."

Commerce is an exchange of equivalents; and surely there has been no greater commercial development in our age than the creation and exchange of an automobile for the cash of the purchaser. I gave six hundred dollars to the makers for my machine, but it has given me stimulated vigor, including increased lung power (surely a legal asset comparable with a knowledge of Blackstone), and a tendency to recreative sociability which neither I, nor the manufacturers, possess as a sale product. In other words, the running of the machine has given me more than six hundred dollars worth of stored vigor and concentrated health. I need not show that my physician's bills were so much less this season than last year to demonstrate the truth of this conclusion; I feel it in my bones, and until a man does feel his health resident within himself, until he knows as a man that he is healthy without waiting for the physician's certificate to enable him to draw his accumulated lodge benefits, he has not gained that surplus of vigor which the machine is designed to assure. Determined by ordinary business methods, can there be any doubt of the fact that my machine has paid for itself when I tell you that it has increased my capacity for decisive work, added to my ability to get a definite thing done with a resolute concentration of purpose? A machine which serves to thrill the physical man; a machine which keeps his head and feet warm at the same time, and from within his own body, no matter how strenuous his mental exertion, has paid for itself, even if the debit and credit sides of the automobile ledger do not balance.

May I ask you to bear in mind that I am a country lawyer living in the Empire State's provincial interior, subject both to the limitations and liberties of my environment. I have been

in the habit of forsaking my office for a month of each year for the purpose of satisfying the spirit of the Wanderlust by roaming anywhere from Glasgow to the Panama canal, or northward to Edmonton under the shadow of Canada's Arctic sunlight but I could not practice law at either of those points and my business suffered during the month of my absence. Then since the time came that I had wandered enough to answer in my own mind Ruskin's question apropos travel: "What is it after you get there?" I had been looking around for a mechanism which would satisfy my daily demand for a change of scene without sacrificing my permanent post-office address. I found that mechanism in my Maxwell, and now I am on the job in my office every morning exchanging honest legal advice for real money, while enjoying my vacation every day after banking hours. The automobile certainly is a good business proposition, to use the vernacular of the commercial traveller.

But my machine and your automobile are destined to be a greater source of profit with the passing of the years. In other words, the machine is going to pay for itself over again. The use of the machine is tending, and is destined to effectively modify, the mercantile system of America and the social habits of Yankee business and professional men. Returning travelers have long regarded as a subject for admiring comment the habit of British business and professional men of leaving their shops at 4 o'clock for a brief evening excursion. To be sure, this habit is due somewhat to what zealous Americans, for want of a better term or epithet, regard as British stolidity; but it is coupled with the English conviction that wealth without health is not worth the task, and that it is the duty of every English man to take daily advantage of those social opportunities afforded by a compact population located in a country of such small area, contiguous to two sea coasts. These are the causes which have induced early closing in England; this is the situation which enabled the writer to observe English business men playing tennis on Oxford green at 10 o'clock one July evening; and this is the combined social and recreative system which must be inaugurated in this country lest the vitality of our substantial families be sapped. But what will induce it but the automobile? And can we expect it to arrive, as a national habit, unless it is stimulated by the knowledge that it is a source of profit?

The fact should not be overlooked that American professional men have remained in their offices beyond reasonable hours because they had no means of going to a definite place for recreation. Population is widely distributed in interior America and sociability without companionship is futile; but the automobile has eliminated the twenty miles which intervene say between a law office and a lake resort; and the possibility of earning the gasoline during the day's work, and then of having a daily vacation without sacrificing the business of the month, are the fore-runners of the coming of the English system of persistent recreative vacations. The automobile, unlike the Pullman car, means some play every day, and a business man with that advantage is going to return to his day's work with a stream of warm blood running to his head, which is the nursery of commercial ideas. This is just where my machine and your automobile have been made to pay for themselves.

While I have not deemed it necessary to tie the text of this discussion to the dollar mark, I am convinced that I have made my car pay for itself in cash in part. The calculation becomes a matter of time saved and money earned. During the three years which have elapsed since my admission to the bar of New York State, I have been impressed with the unwillingness or inability of the rural law offices to keep pace with the evolution of modern business. There is a duplication of offices and

of the 194 volumes which constitute the New York reports, sometimes there is an excusable duplication of stenographers, but then every office needs its decorations in addition to a picture of Daniel Webster, and in any event something must be done to retain the interest of the law clerk in the work of the office. But in the midst of this unwillingness and duplication it occurred to me that it was time to abolish as many "whereases" and "aforesaid" as is possible in the practice of the profession and to put the office machinery on "high gear." And my machine has tended to pay for itself in that it has accelerated the coming of that day. I had noticed that the young physician was using the auto as a right-hand assistant and I had been pained to wait in police court while my clients were brought in by gasoline machinery, and then it occurred to me that some machinery other than a Smith Premier and a telephone should be attached to a young lawyer's office; and so I bought my Maxwell in the conviction that I could make the car pay for itself.

A concrete demonstration of the truth of the latter conclusion was afforded during the first week that I operated the car. The whole transaction was a matter of machinery. I arrived at my office in the morning and the telegraph machine brought me a message stating that the attorney-general in Albany wanted me on the long distance telephone machine at 10 o'clock. I learned that he desired to enter suit for a penalty against a farmer for violating the pure milk act, and he wanted the action brought with some speed plus. I dictated the complaint to a typewriter, and that Saturday afternoon at 2 o'clock the law student and I started for a jaunt over the hills of Chautauqua county to serve the papers on the defendant. We moved along the shores of Lake Chautauqua, and over the historic French portage to the shores of Lake Erie, where we found the defendant amidst his grape vines. Returning from our thirty miles we came down the other side of Lake Chautauqua just to tip off a farmer that he "must either pay or be sued," and we collected sufficient money on the spot to warrant the taking of a fee large enough to pay for the next week's gasoline and cylinder oil. But the real point of this paragraph may be summarized by calling attention to the fact that the suit was brought in quicker time than the anxious attorney-general may have anticipated, and this did not disturb the enjoyment of our Saturday afternoon outing.

The utility of the automobile should be viewed as a time-saver and money-maker. I could never make any money out of my clients by advising them over the telephone; but I can induce them to pay my fees when I "meet them face to face," to use the touching words of the Methodist hymnal. And, right there, my car has earned many a dollar for itself. Letters sent out on the rural delivery lines have seldom induced farmers to pay, because the dishonest ones believed that no lawyer would stake the constable to a horse and carriage to make the trip over poor roads to serve a summons on a person of doubtful responsibility; while the honest ones always had the excuse during August that they could not call until the crops were in, and the pretext during January that no bills could be settled until the taxes were paid. But when the law student journeyed to their respective habitations in the machine, it was a question of pay, or offer a well-grounded excuse. Needless to say, a student with my car and his gall never failed to collect.

This brings me to the point that the supreme need of a young lawyer is to "get next" to his client. The automobile just meets this situation; it may be used with propriety to run to the country districts where the dying woman wants to make her last will and testament, and in a variety of real estate transactions it has proved to be of service in going to the spot, determining the vexing boundaries, and returning with speed to complete the legal papers. It is needless to amplify the fact that the machine may be utilized in a variety of ways in obviating those delays which have prevented the profession from keeping pace with the money-earning development of the modern business man. This implies time saved and money earned; and these are the elements which make a car pay for itself.

Need I say in passing that there is a money value in using the car to "know" one's own habitat. Increasing acquaintance follows, as a matter of course; but it is well to keep in touch with the situation in the rural districts surrounding a small-sized city. This matter of personal contact, this problem of getting knowledge of the situation based on the earth, is overlooked by those professional men who do not dabble in politics enough to keep them in touch with the passengers on "the gravel train." But the inability to judge the local situation from the fourth floor of an office building, and the remedy for that incapacity provided by the automobile, has been impressed upon my mind of late. Long before I either wanted, or perceived, the professional utility of a car, I had prepared a variety of briefs advocating the improvement of the main highways of the county and state. These briefs were predicated on the bad condition of the highways hereabouts, and, while I have nothing to say in defense of those same roads in the light of later knowledge, I am willing to admit that the highways then in mind have been found to be in better condition than anticipated. Certainly a student of the conditions surrounding the city in which he lives and an observer of the situation in those rural sections which give life to the business in which he is engaged, can get his money out of his car by using it for "a rubber-neck wagon" through the hay and grape lands of Chautauqua County.

And now it is 4 o'clock of a bright Sunday afternoon. I have worked for three hours giving form to this narrative, and as I am about to substitute the "clickety-click-click" of my typewriter for the "honk, honk" of my car, why can you wonder that I am convinced that I have made my machine pay for itself?

NEWS FROM GARAGES IN MANY CITIES

New Haven, Conn.—A garage and repair shop has been opened at Commerce and Temple streets by the Wheeler & Wuestefeld Company. A turntable, automobile elevator, a modern locker system, up-to-date wash stands and repair pits, waiting rooms for chauffeurs and patrons and an extensive repair shop are a few of the advantages. Entrances on both Temple and Commerce streets do away with any necessity of turning around or backing inside the garage.

Amsterdam, N. Y.—Green & Warnick will occupy their new garage about April 1. The building is to be 75 by 85 feet, two stories in height and of fireproof construction. The first floor will contain the office and stock room and storage space for about 30 cars. The second floor will be partly occupied by a large repair shop, with room for storing 30 or 40 additional cars.

Holyoke, Mass.—The Magna Automobile Company has moved into its new two-story building at the corner of Division and Railroad streets. The company has good facilities for handling both local and transient automobilists. A large machine and repair shop is maintained in the basement.

Mishawaka, Ind.—John L. Wilklow, a former livyerman of this city, intends to have an up-to-date garage soon. He has begun the erection of a two-story building on his property adjoining the new Mishawaka Hotel. The building will be of brick, 100 by 20 feet.

Pittsburg—The Pittsburgh Automobile Company has leased a plot 40 by 100 feet on Baum Street, near Beatty, East End, and is having plans prepared for a three-story fireproof garage. The company's present location is at Seventh Avenue and Grant Boulevard.

St. Catharines, Ont.—The Reo Garage, of this city, has originated a new storage scheme. Cars sent to be overhauled will be stored during the winter if desired, and no charge will be made except for work done and the repair parts at list prices.

Cincinnati—Work is nearly finished on the new garage of the Jungless Automobile Company at Reading road and Maple avenue, Avondale, and it is expected that it will be ready for occupancy this week.



Cartercar an Awful Hard Puller, Outputs Traction Engine

George Reason, branch manager for the Cartercar Company of Detroit, says that he is not afraid to hitch the Cartercar to anything, because of the steady pull the car exerts through its friction transmission and chain-in-oil drive, and that this is possible because of the unlimited number of speeds on a Cartercar.

Premier in Vaudeville—To help Santa Claus in his annual labors, five vaudeville performers at one of the Indianapolis theaters started giving entertainments in the hotels, clubs and restaurants before and after theater hours, assisting the fund raised by a local newspaper. However, they found it no small task to visit all the places afoot. When H. O. Smith, of the Premier Company, heard of this he tendered the use of one of the company's automobiles, and from that moment the vaudevillians became familiar sights in the streets of Indianapolis. They raised more than \$500 for the fund, and as a result hundreds of little shavers found that old man Santa had jammed their stockings full on Christmas morning, much to their delight.

Omaha Dealers' Meeting—At a meeting of the Omaha, Neb., Automobile Show Association, held last week, the following officers were elected: J. J. Deright, president; J. T. Stewart, vice-president, and C. G. Powell, secretary and treasurer. The officers, with Willard Hosford and T. R. Kimball, constitute the board of directors. There are at present 20 members of the association, and as many more applications for membership on file, so great has been the growth of the trade in this city. The show this year will be held in the Auditorium under the management of Messrs. Powell and Hosford.

Hoblitt Is Promoted—Fred M. Hoblitt, who will be remembered by future generations as the hero of the horse-fly-in-the-carburetor epic, found on his return from a trip in the West that he

had been appointed supervisor of agencies of the American Locomotive Company. During the trip he established agencies in San Francisco, Seattle, Denver and Minneapolis. From the latter city he telephoned to New York an order from the Twin City Taxicab Company for 85 taxicabs, to pleasure cars and two trucks. The order was accepted by telephone.

Washington Oil Tank Finished—The Wayne Oil Tank Company has about completed work on the large tank system in the naval yards at Washington, D. C., and it is ready for shipment. The equipment consists of 14 tanks with long-distance pumps. The tanks will be used for the storage of many different oils and preparations, and will vary in capacity from 10 barrels to 1,000 gallons. Iron of a heavy gauge has been used in their construction, and the pumps are a special self-measuring pattern. The whole is pronounced by experts to be a most thorough system.

Fisk Wins in Texas—A set of Fisk tires on an Overland car won the prize offered for tire performance in the 550-mile Dallas-Fort Worth, Tex., endurance run. This car and the Cole pilot car, also a Fisk user, were the only ones to receive perfect tire scores; neither experienced any trouble, nor was it necessary to touch either casings or tubes throughout the run. The contest was over execrable roads, and the fact that the winning car crossed the finish line carrying more than 100 pounds of mud, by actual weight, gives some idea of the conditions encountered.

New "Six" from Ohio—The Sebring Motor Car Company, of Sebring, O., announces the 1910 model of the Sebring "Six," a 35-horsepower car, selling at \$2,750. To try the mettle of the new product a test run was made to New Liverpool on the high gear, with the gear lever sealed in place. Another car of well-known make which accompanied the local product was forced to change gears repeatedly, but the Sebring took the steep hills on the route without difficulty.

More from South Bend—This hustling Indiana city gets its name in print again through the organization of the Yuster Axle and Transmission Company, capitalized at \$100,000. The incorporators and directors are Maurie L. Yuster and Arthur E. Wile, of Rochester, Ind., and Joseph W. Ricketts, of the Ricketts Automobile Company, South Bend. The company has leased a plant consisting of three one-story buildings, which affords facilities for the employment of 50 men.

Lovell-McConnell Enlarges—A new plant is being built by the Lovell-McConnell Company, of Newark, N. J., on a large plot at Wright and Emmet streets, Newark, which it recently purchased. There will be a two-story machine shop, 200 by 50 feet; a foundry, 75 by 40 feet; a fireproof building for storing excelsior; a private garage and a power plant. The Lovell-McConnell Company makes Klaxon horns and other automobile accessories.

Newspaper Science—As an example of the deep technical knowledge of the average newspaper reporter and the resulting product of his busy pencil, we recommend this quotation from the Chicago Journal, November 26, sent us by C. H. Gould. It follows: "... was run over and seriously injured in cranking his car. He left the spark in when he began cranking. The spark ignited and the automobile started. He was knocked down and run over."

Taking Sugar to Fort Lee—In the Edgewater-Fort Lee hill climb, December 5, a three-ton American truck carried a full load of sugar in barrels up the grade in 5:15. The distance was 3000 feet, and the grade was said to average 17 per cent. The truck took the hill and was not steaming or showing other signs of distress at the top. It is to be hoped that the sugar in question was not weighed at the New York custom-house.

Simms Magnetos in England—Reports from across the Atlantic tell of the winning of the \$5,000 Daily Mail aero prize by J. Moore Brabazon on an aeroplane of his own design, fitted with a Greene motor and Simms magneto. An Indian motorcycle, also fitted with a Simms magneto, recently broke the world's records for 20, 50 and 100 miles on Brooklands track.

Autocar Succeeds the Horse—So successful has been the test made by the Philadelphia postal authorities with the Autocar wagons that last week Postmaster-General Hitchcock secured a contract for four machiues, for use on the outlying service. The terms call for a rental of \$3,000 a year per car, including the driver. This deal will enable the department to do away with nine horse-drawn wagons.

More Warner Tops—The Warner Pole & Top Company, of Cincinnati, has enlarged its plant about 300 per cent., according to a statement from the company, and will be in new quarters ready for business by January 1. Preparations have been made to take care of an increased business during 1910, and it is expected the output will be 1,000 tops.

To Remedy Parts Shortage—The Stoll Pressed Steel Company, of Buffalo, N. Y., has filed articles of incorporation with a capital stock of \$50,000. The incorporators are Daniel H. Stoll, Charles G. Hornung and others. The company will manufacture automobile frames and metal stampings.

Relocation of Buckeye Jacks—Due to increased business it became necessary for the Buckeye Jack Mfg. Co., of Louisville, Ky., to seek larger quarters. The company therefore purchased a commodious plant at Alliance, O., to which it will move about January 1.

IN AND ABOUT THE AGENCIES

Stewart Speedometers, Chicago—A sales office has been opened at 1312 Michigan avenue by the Stewart & Clark Mfg. Co., in order to give prompt attention to the wants of the city trade. Heretofore Chicago patrons have been obliged to go to the factory on Diversey boulevard.

Regal, Pittsburg—Joseph Feicht, who has the Pittsburg agency for the Regal, has taken over the building of the Central Automobile Company, at 5983 Center avenue, and will locate there.

Thomas, Boston—Charles S. Henshaw, Boston agent for the Thomas, has leased the store at 587 Boylston street, and in the future this will be the local home of the Thomas Company.

Great Western, Macomb, Ill.—The Great Western Automobile Company has made arrangements with A. T. Ewing, Son & Deems, of Macomb, to handle the Great Western line.

Stevens-Duryea, Newark, N. J.—A. G. Spaulding & Company have leased the store formerly occupied by H. J. Kochler at 849 Broad street, and will exhibit the Stevens-Duryea.

PERSONAL TRADE MENTION

James W. Gilson, sales manager of the Mitchell Motor Car Company, appeared in a new rôle on Christmas day 11e

rendered a song of his own composition at the celebration in the Bijou Theater, which was turned over to the poor of the city, and then Mr. Gilson appeared as Santa Claus.

George D. Wilcox, formerly of the Empire Sales Company, of Syracuse, N. Y., has been appointed district sales manager for the Regal Motor Car Company. He will make his headquarters in Syracuse for the present.

WESTERN MOTOR'S NEW MARION PLANT

LOGANSFORD, IND., Dec. 27.—There is no industry to-day that occupies such a commanding position as the automobile industry. Its wonderful growth in recent years has astounded the world and put to flight all the conservative ideas of careful business men. This is due to two things—the necessity existing for a means of travel, speedy, reliable, at the constant command of the public, and the fact that the gasoline motor in its present high state of perfection has made this possible.

Manufacturing automobile parts as a business is comparatively new, but today commands the attention and investment of the most progressive men in the world. There is scarcely an automobile placed upon the market that does not profit by the opportunity of securing certain parts manufactured by factories especially devoted to their production, and using these as the means of assembling a perfect car.

The life of an automobile is the motor; without it it is dead. So that the necessity of having a motor absolutely reliable, thoroughly durable, is most apparent. The Rutenber motor, manufactured by the Western Motor Company, stands very high in the estimation of the public as a motor of this character. Built by one of the oldest established firms, it has been in existence practically fifteen years, and is the oldest four-cylinder motor upon the market. This company has its own foundry, making every casting that enters into the construction of the motor, thus avoiding delay or faulty workmanship.

The world's record, made in 1906 by a stock car equipped with a 4½ by 5 Ruten-



Miller's New Atlanta Branch

In accordance with his pushing policy to locate a branch office wherever business conditions warrant. The cut above shows the new store recently opened in Atlanta, Ga. This is located at 46 Edgewood avenue, a very favorable location for the automobile supply business. It is to be hoped that branch number nine will fare as well at the hands of the Southern people as its other Northern branches have.

ber motor, held good until this present season, when a special racing car, upon an especially prepared track, was able to lower the record. This speaks very well for the every-day qualities of this motor as compared with other regular products.

Being absolutely certain of the future of the industry, the Western Motor Company has built a large new factory, following plans furnished by the Kahn Construction Company of Detroit, Mich., at Marion, Ind., and with their two large factories, the other at Logansport, Ind., they will have a production of practically 10,000 engines per year, thus placing them in the foremost rank of motor builders in the country.

The management has been enlarged, each factory being under the supervision of members of the firm, whose experience and ability insure a continuation of the same perfection in design and the same excellent workmanship that has always characterized these motors. The present officers of the company are F. B. Wilkinson, president; J. F. Digan, vice-president; E. H. Wolcott, secretary; J. Wills Stephenson, treasurer; E. A. Rutenber, mechanical engineer, with a directorate consisting of the same gentlemen and in addition A. C. Barley, C. G. Barley and J. L. Barley.



Perspective View of Western Motor Company's Marion Plant

